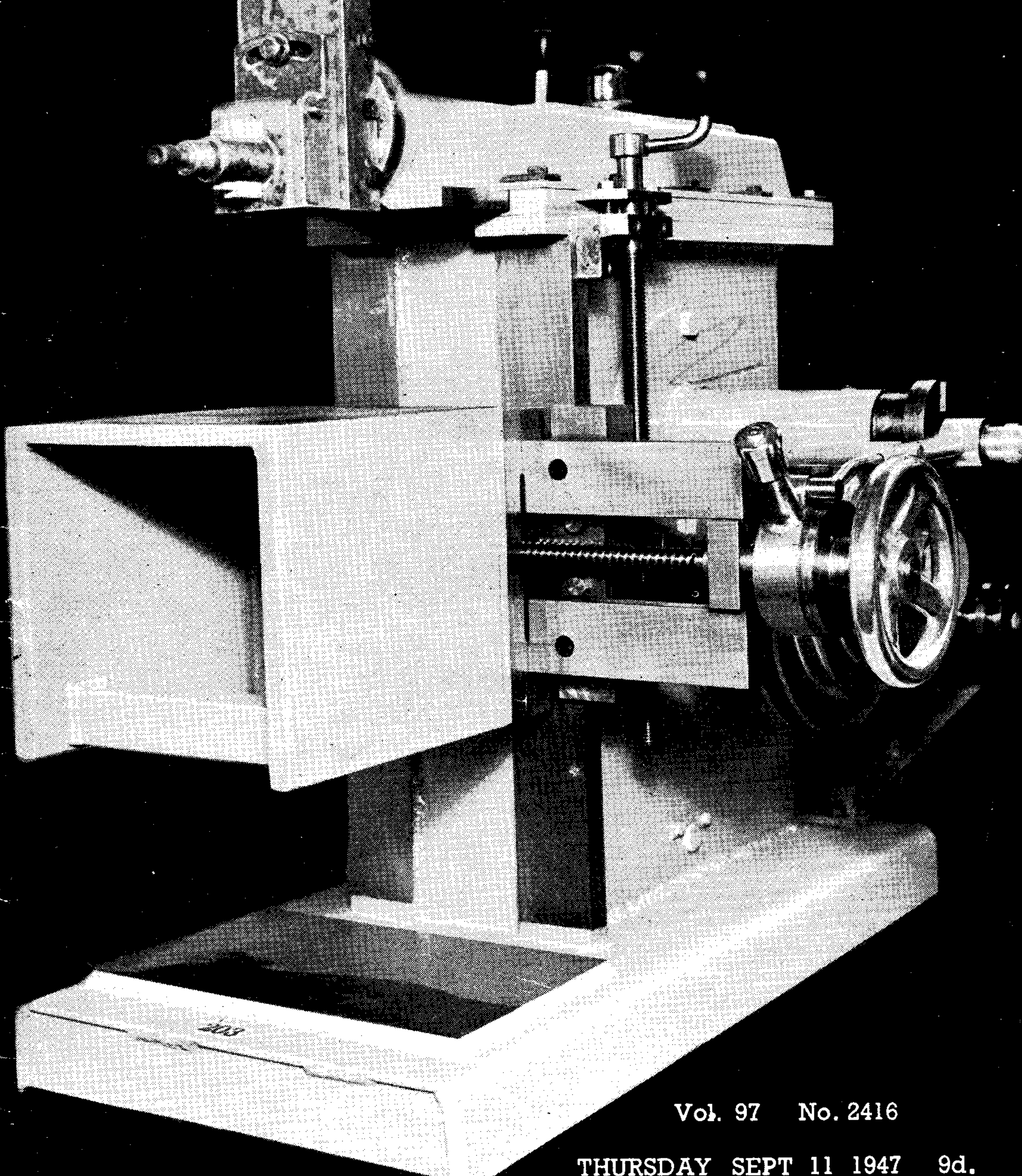
THE MODEL ENGINEER



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The MODEL ENGINEER

PERCIVAL MARSHALL & CO. LTD., 23, GREAT QUEEN ST., LONDON, W.C.2

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SMOKE RINGS

Our Cover Picture

● THE SHAPING machine shown on our cover and photographed at this year's Exhibition was built by Mr. J. R. Mann, a member of the Northampton Society of Model Engineers from his own design and drawings. The machine, which is power driven, has a variable stroke up to 8 in., a three-speed drive and clutch, and an automatic traverse for the table swivel-head. The main gear was cut from blanks supplied commercially and the welding of the fabricated body was done professionally. Apart from this, Mr. Mann built this machine entirely in his own workshop which, he tells us, is equipped with a lathe, drilling machine and the usual hand tools. The overall dimensions are 2 ft. wide by 3 ft. long and 2 ft. 6 in. high. A bronze medal was awarded to this entry, and Mr. Mann is to be congratulated not only on having created a machine which will be a valuable adjunct to his workshop but also upon saving himself a very considerable sum of money into the bargain.

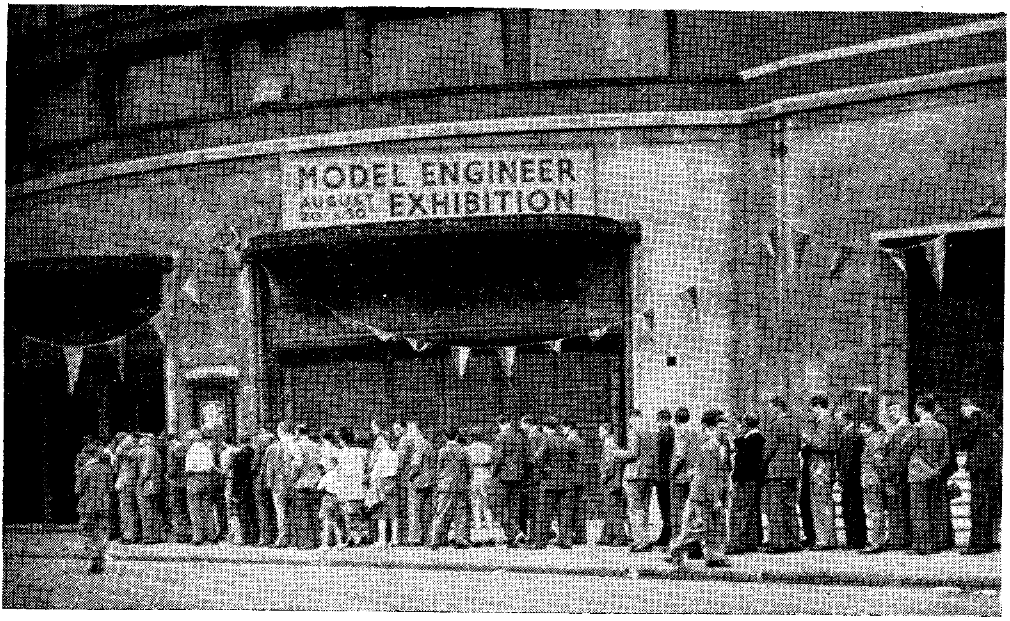
Exhibition Awards

● WE SHALL publish a fuller list of Exhibition awards in an early issue, but, for the moment, here are some of the principal successes. Championship Cups—Locomotive Section, Mr. J. I. Austen-Walton, for his 5-in. gauge L.M.S. locomotive "Centaur"; General Section, Mr. G. E. Hartung, for his compound condensing marine engine; Marine Section, Mr. J. F. Alderson, for his rigged sailing ship model, and Mr. D. McNarry, for his water-line model of the Union Castle Liner *Stirling Castle.* The Bombay Cup, for a model of historical interest, was awarded to Mr. A. B. Handcock for his model 1st Rater 100-gun Medieval Warship, *circa* 1700 A.D. The Club Championship Cup was won by one of the youngest societies, The Worthing and District Society of Model Engineers, who were represented by Mr. Austen-Walton's Cup locomotive, Mr. G. C. S. Seyman's Austin car chassis (Silver Medal), and Mr. H. C. Wheat's model breakdown crane (V.H.C.). A fuller commentary on this competition will appear later.

Our Critics

● OF COURSE our Exhibition has had its critics—there never was a perfect exhibition and there never will be. The perfect things in this world are few and far between, and are hard to find. It is a curious paradox that some people are only really happy when they are miserable; when they have found something to grumble about they rise and shine, they are on their toes, and the world knows that a superior being has found his voice. Many of our visitors, most of them, I am glad to say, come looking for something to praise, and I am sure they are not disappointed. They come to me and say, "I like so-and-so," or "What a lovely piece of work so-and-so's model is." They may say, "I miss so-and-so," or "I would rather see so-and-so," but that is fair comment and helpful to the organisers in planning future shows. But what shall I say to the visitor who writes that he is "disgusted with the Exhibition and will not come again unless it is run on very different lines"? I would not mind making a small bet that he was one of our happiest visitors. Thoroughly happy because he had found something about which he could really go off the deep end. What a contrast to people who find their happiness in other ways. During my own wanderings round the show I have found endless examples of fine craftsmanship, as also of more modest achievements, behind which I can visualise the patient work, the enthusiasm and

the happy recreation which the makers have so much enjoyed. I have encountered many a grip of the hand and pleasant smile, many an encouraging voice, and many an appreciative comment on the result of six months of patient preparation. So I, too, have had a happy show, but I have found my pleasure in the happiness of other people and in the remarkable display of beautiful work. I do not quarrel with my disgruntled correspondent, for he is fully entitled to his own opinion. But what a sad thing it is when there is around us so much to enjoy, so much that is good, that there are people who are blind to the things which make, or should make, this world a pleasant place to live in. As a contrast, I quote this sentence from another letter: "I took a party of forty to the Exhibition and everyone enjoyed it."



Fine weather prevailed from start to finish

Models Televised

● SOME EXCELLENT publicity was given to the Exhibition through the Television Section of the B.B.C. The models shown on the screen were Mr. F. G. Bettle's traction engine, Mr. Bravery's model lighthouse made from matches, Mr. G. C. S. Seyman's Austin car chassis, and the rowing skiff made by Mr. G. Fallowfield, who is both blind and deaf. Mr. F. W. Bontor once again kindly acted as demonstrator and the B.B.C. tells me "he was in very good form, and gave a most wonderful interview."

A Chesterfield Revival

● I AM pleased to hear from Mr. B. Chambers, who tracked me down at the Exhibition, that the model engineers of Chesterfield are getting organised again. The first meeting of the new Society will be held at 7.30 p.m. on September 15th at The Settlement, off Packers Row, Chesterfield, when both new and old friends will be welcome. In pre-war days Chesterfield, a city of much engineering talent, had a very live Society. Some of the old members are rallying round the new flag, and I wish them much success. Mr. Chambers will be pleased to hear from all interested at 78, Heaton Street, Brampton.

At St. Albans in the Autumn

● MODEL ENGINEERING promises to be in high feather at St. Albans in November next, when another non-competitive exhibition is to be held in aid of the local hospital. The dates are November 22nd to the 29th. Mr. Ronald F. Faulder has the matter in hand, and tells me that loan exhibits will be particularly welcome. He adds that the formation of a local society is contemplated, arising out of the exhibition. His address is 21, Francis Avenue, St. Albans.

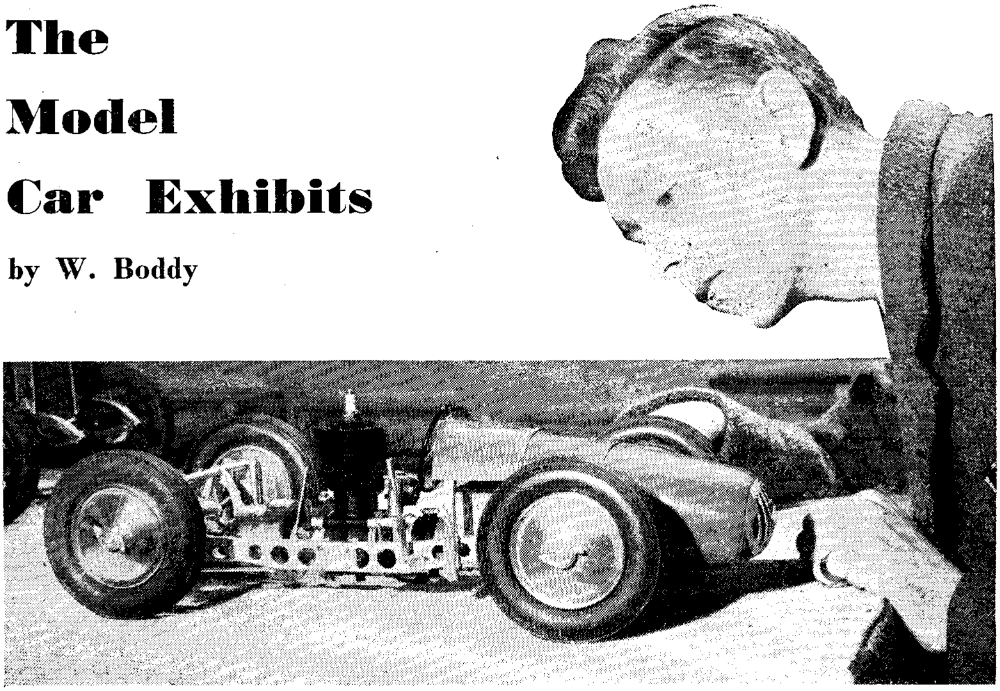
An Acknowledgment

● A NOTE from Mr. H. Leslie Overend, of the Overend Press Agency, of Bradford, tells me the one or two photographs of Mr. Hollings and the West Riding Society's track, which we have recently used, have escaped the customary acknowledgment. Our apologies to Mr. Overend for the inadvertent omission. He is always a good friend to model engineers, and a fine photographer whose pictures are always most welcome additions to THE MODEL ENGINEER.

Percival Marshall

The Model Car Exhibits

by W. Boddy



A model racing car with a 10 *c.c. two- stroke engine made by Mr. G. W. Sole of Stratford-on-Avon*

THERE was evidence at this year's Exhibition that model car exponents have been really busy since 1946. Indeed, for the first time, models of road vehicles came into their own, instead of being in a regrettable minority.

As soon as I entered the hall the splendid model by Mr. G. C. S. Seyman, of Southwick, of a 1929 Austin Heavy Twelve chassis, caught my eye. This chassis, of imposing dimensions, is the finest combination of working and prototype motor-car model I have seen. Whether you looked critically at its radiator, road springs, its working two-shoe cable-operated brakes, its transmission or its engine, the prototype was remarkably faithfully reproduced. The pedals, gear-lever (even to its reverse trigger) and gear-gate were typically "Austin"; so were the working minor control levers above their dished plate in the steering wheel centre. The four-cylinder engine, with its scale carburation and exhaust details, belt-driven fan, etc., I will leave to Mr. Westbury's more able pen. Suffice it to say that Mr. Seyman's model won my greatest admiration. The only departure from prototype was the use of horizontal overhead valves, whereas in the "real thing" the valves were side by side; the location of the fuel tank in the middle of the chassis is correct for the early 1929 car.

Adjacent to this fine model were Mr. F. E. Backshell's petrol model of a 1937 Mercedes-Benz racing car, Mr. H. R. Hartley's already-famous racing car chassis and a 10-c.c. racing car by Mr. G. W. Sole. The first-named had non-prototype half elliptic rear suspension and coil-spring i.f.s., and its body remained to be fitted. Hartley's workmanlike chassis is a clever instance of powering a scale-model chassis with a single-cylinder engine. Correct steering was noted, with minor controls on the wheel, the ignition coil was cunningly placed to represent a dashboard fuel tank, and "1066" tyres were fitted. Mr. Sole's car had a liberally-drilled chassis frame, centrally located two-stroke engine and Lancia-type independent front suspension.

This year the juniors, I was glad to find, showed more road vehicle models. In this section J. R. Simonson exhibited an omnibus, a 6-wheeled lorry with trailer, an articulated lorry and an 8-wheeled van, all to 4-mm. scale, while C. Durham showed eight tiny assorted vehicles mounted on a base, including Scammell, Ford, A.E.C. and Leyland commercials.

The class for mechanically-propelled road vehicles was the domain of traction engines and an L.C.C. trailer tram, if we except the aforementioned Austin chassis and Mr. J. B. Cousin's 4-mm. scale, 4-wheeled, double-deck A.E.C. "Regent" omnibus.

The Pioneer Model Racing Car Club not only had a fine showcase of petrol-model racing cars, Jones's famous Alfa-Romeo and the Gardner M.G. amongst them, but gave exhibitions on the Grand Circular Track, which were a constant draw for everyone in the hall. I think Mr. Zere was the first person to set a car on this track, and very fast it went. I heard many expressions of appreciation that the Exhibition organisers had managed to lay a track of such generous

dimensions. Certainly the demonstrations of really fast model cars which took place from the opening of the Exhibition thrilled the public and gained many new adherents to the pastime.

It was truly encouraging to note the number of trade exhibitors who showed model cars or their equipment. Whereas last year interest was clearly growing, this time one felt that the model car had arrived and that there will be keen and healthy competition in this field of model engineering in future.

Modelcraft Ltd., showed some extremely fine models of racing cars by Rex Hays, to a scale of ½ in. = 1 ft. The Grand Prix Mercedes-Benz, 3-litre; the famous "blower" Bentley 4½ litre 4-seater, as run at Le Mans; the "3.3" Bugatti and the 1924 2 litre, G.P. Sunbeam were on view in neat Perspex cases, each car beautifully finished and displaying a profundity of detail. Kits for the assembly of similar models were selling readily at 8s. 6d. a time. In addition, Modelcraft had a big variety of fascinating 4-mm. commercial vehicles and accessories for same. Some of these little vehicles were solemnly circulating round a small track.

Cartwright's Model Supplies Ltd., showed similar, but smaller, Mercedes-Benz and G.P. Bugatti models, built from 12s. 6d. S.M.E. kits and were demonstrating r.t.p. running of one of these models, electrically energised by a tiny motor they are introducing. They also showed 'bus and lorry "solids."

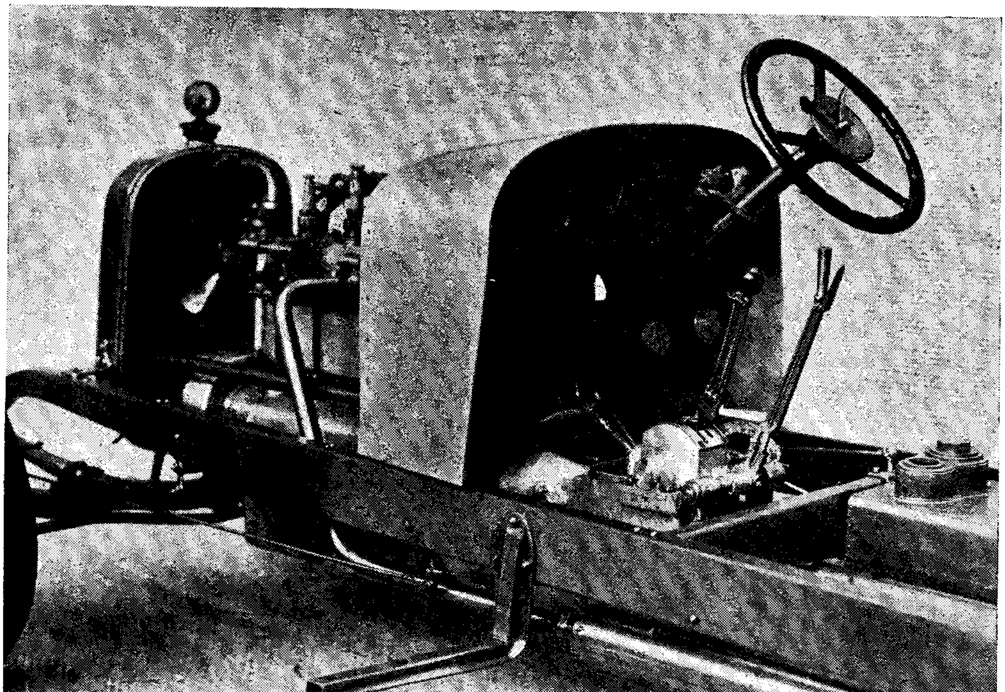
Wilson's Lorries Ltd., aroused great interest with a factory wherein "Aristocrat" 'buses and "Autocrat" lorries were in process of assembly. They also showed a comprehensive range of their well-known 4-mm. scale commercial vehicles, and the splendid finish of these was most noticeable; they were all built from the famous Wilson kits, as was the 7-mm. scale Foden omnibus model that drew such favourable comment.

M. and E. Models, Ltd., showed a number of petrol and diesel-engined racing cars and demonstrated them on the track. I was very interested in their enclosed cockpit model, as I have frequently advocated this method of hiding a vertical cylinder. Another of their petrol models was of the twin-cam racing Austin Seven. They had built all these cars round their standard chassis, which was offered in kit form for £12 10s., complete with body. Components and accessories were also listed separately.

Another stand which attracted large crowds of petrol enthusiasts was that of "Ten-Sixty-Six" Products Ltd., who not only displayed their well-known engines and accessories, but who had a racing car kit on show, priced at £4 12s. 6d., as a chassis with clutch transmission, or at £3 2s. 6d., less clutch. They also offered a gearbox for petrol model axles, in kit form.

E. Keil and Co. Ltd., was yet another exhibitor showing a race-car kit, in this instance

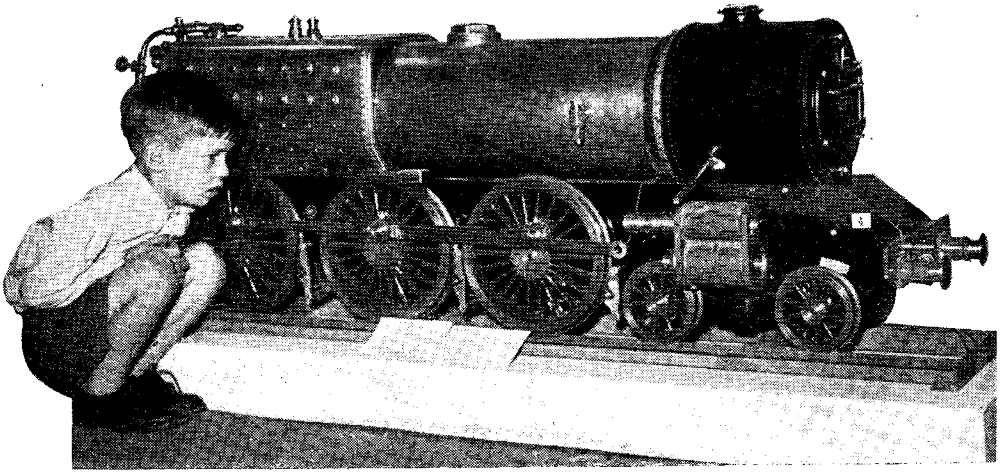
(*Continued on page* 288)



A close-up of a model Austin 12 *h.p. heavy* 1929 *model, made by Mr. G. C. S. Seyman of Southwick*

Prize-Winning Locomotives

by J. N. Maskelyne, A.I.Loco.E.



A very young "Inspector" of an unfinished model "Royal Scot" locomotive

NOW that my duties on the panel of judges have been, I hope, successfully concluded once again, I am free to give public expression to some comments upon the exhibits in Class 1 of the Locomotives and Railways section of the competition.

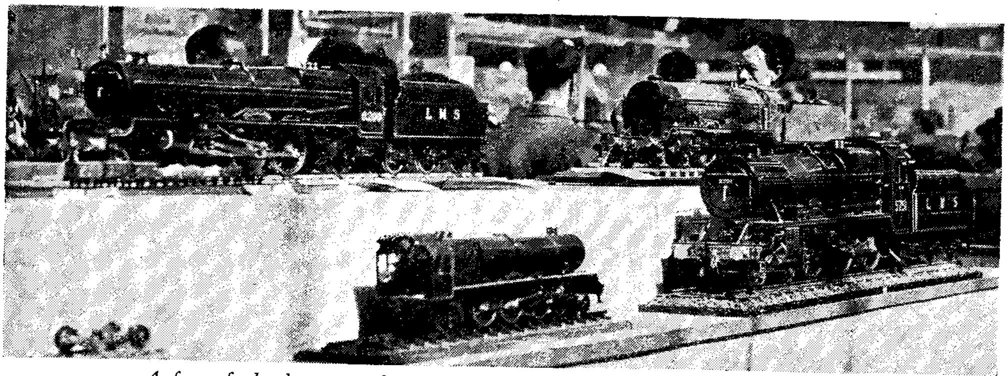
The first impression that I had, during a preliminary look round the hall before the exhibition opened, was that the quality of workmanship in all sections had recovered its pre-war standard, and was considerably better than that of last year. I will not attempt to offer an explanation of this fact, but will merely state that I was agreeably surprised. In view of all the difficulties which still persist in tormenting us, I had been prepared to find little, if any, improvement over last year's exhibition. How wrong I was!

With the foregoing paragraphs in mind, readers may be interested to know that, before we actually began our work, we three judges—W. R. Dunn, K. N. Harris and myself—came quite independently to the same decision as to which of the exhibits was the potential Cup-winner. To my mind, there was no question about it; Mr. J. I. Austen-Walton's 5-in. gauge 4-6-0 locomotive, *Centaur*, scored practically full marks under each of the five headings by which we judged it. We had known beforehand from the entry-form that Mr. Austen-Walton's workshop facilities and his ability to use them were above the average; therefore, we naturally expected him to turn out a very fine piece of work, and his "handicap" was consequently heavy. On one small point he "fell down" rather surprisingly; when *Centaur's* regulator is wide open, operation of the fire-hole door is very awkward, owing to the regulator handle getting in the way.

With the Cup-winner finally and irrevocably decided, what a tussle we had with the others! So many seemed to be equal in general merit. Mr. E. Kench's 3½-in. gauge 3-cylinder L.M.S. *Royal Scot* succeeded in gaining one of two Silver Medals awarded in this class, the other going to Mr. A. W. G. Tucker's fine 3½-in. 4-cylinder 4-6-0 engine, *Lady Anna*, fitted with Holcroft conjugated valve-gear. These two engines provided the judges with a really tough problem to solve, and readers may be interested to know how the markings compared. Under the heading "Workmanship and Finish," Mr. Tucker was 10 marks down; under "Quantity of Work," equal; under "Suitability of Material," 5 marks down; under "Fidelity to Prototype," 50 marks down, and under "Design and Originality," 60 marks up. His total was 5 marks down.

With the others, we had to be thoroughly ruthless. All the same, two V.H.C. Diplomas were awarded, respectively to Mr. W. G. Dennis's 1½-in. scale 0-4-0 Saddle-tank and Mr. N. E. Nicholson's 3½-in. gauge L.M.S. 4-6-2 *Princess Royal*, the total marks for each being the same. Both these engines achieved a very high standard in workmanship and in fidelity to prototype.

Other Diploma winners were Mr. W. D. Hollings's 3½-in. gauge 4-6-2 locomotive based on the L.M.S. *Princess Elizabeth*, and Mr. E. R. Morten's 1¾-in. gauge L.M.S. "Class 5" 4-6-0 engine. The latter was of particular interest to me; for seldom, if ever, have I seen a small-scale *steam* locomotive in which so much external detail has been so accurately reproduced to scale. Obviously the work of an enthusiast with comparatively limited facilities, Mr. Morten's engine is spirit-fired and, consequently, of somewhat simple general construction; but externally she is, so to speak, the "living image" of her prototype. She proves that "it *can* be done," and it behoves all of us to try to follow the example she sets, no matter what the scale is.



A few of the larger scale model locomotives displayed at the exhibition

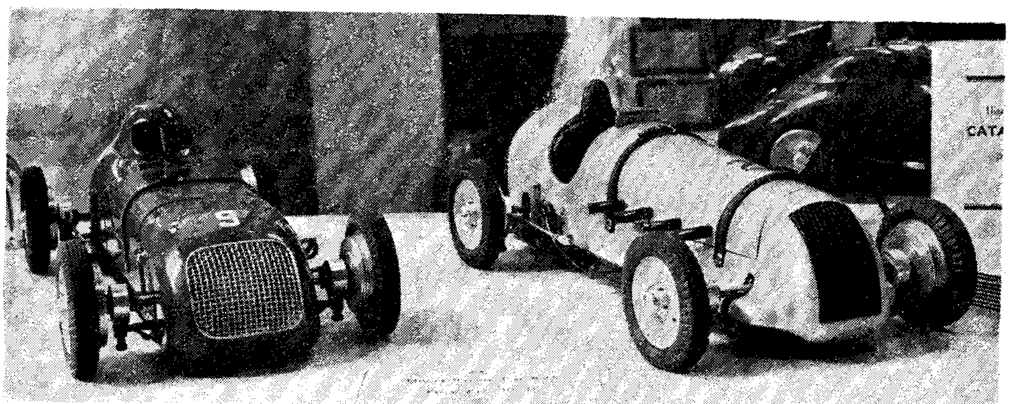
I intend, in due course, to write a critical survey of all the exhibits in this section of the Exhibition; but here I want briefly to refer to one or two other items which were of interest to me. Mrs. M. A. Austen-Walton's free-lance 2½-in. gauge 0-4-0 tank engine, spirit-fired and of the simplest possible construction, made me wish that cheap steam locomotives had been of *that* standard in my young days! Mr. H. Ellison's chassis for a Midland Railway "999" class 4-4-0 engine, complete with an exact reproduction of the Deeley valve-gear, is the first of its kind that I have seen; it is a beautiful piece of work, and I look forward to seeing it finished. Mr. F. R. Forest's 2½-in. gauge L.N.E.R. *Flying Scotsman* is a most ambitious "first attempt," successfully completed, and an excellent example to other novices.

The Model Car Exhibits

(*Continued from page* 286)

that of the Experimental & Model Co., costing £11. A smart, highly-polished body was part of this kit and a finished car was shown, with a vertical 6-c.c. Stentor engine in its tail. On this stand I also spotted a very neat little model of a Panther solo motor-cycle, made in 1945.

Modella Engines (Bradford) Ltd., had one of their 5-c.c. "Owat" diesel engines installed in a policeman and divers traffic lights more obediently than their full-size counterparts outside the hall! Prestico Ltd., exhibited lorry and Jeep kits and a Jeep and 4, 6- and 8-wheeled lorries built from sheet-metal, and further road vehicles were encountered at the Army Apprentices' School stand, in the form of a Diamond-T tractor and Rodger trailer and a Scammell



Two petrol-driven model racing cars exhibited by M. & E. Models Limited

racing car, while Juneero Ltd. displayed a petrol chassis and a R.A.F. tractor with trailer.

Model Roadways always had a press of humanity round their complex road system, over which little electrically-propelled lorries and cars motored happily, obeying a busy tank transporter, beautifully modelled by No. 7 Central Workshops, R.E.M.E.

This review is necessarily brief, but it will indicate, I hope, how far the model road vehicle has got towards being accepted as a normal branch of model engineering.

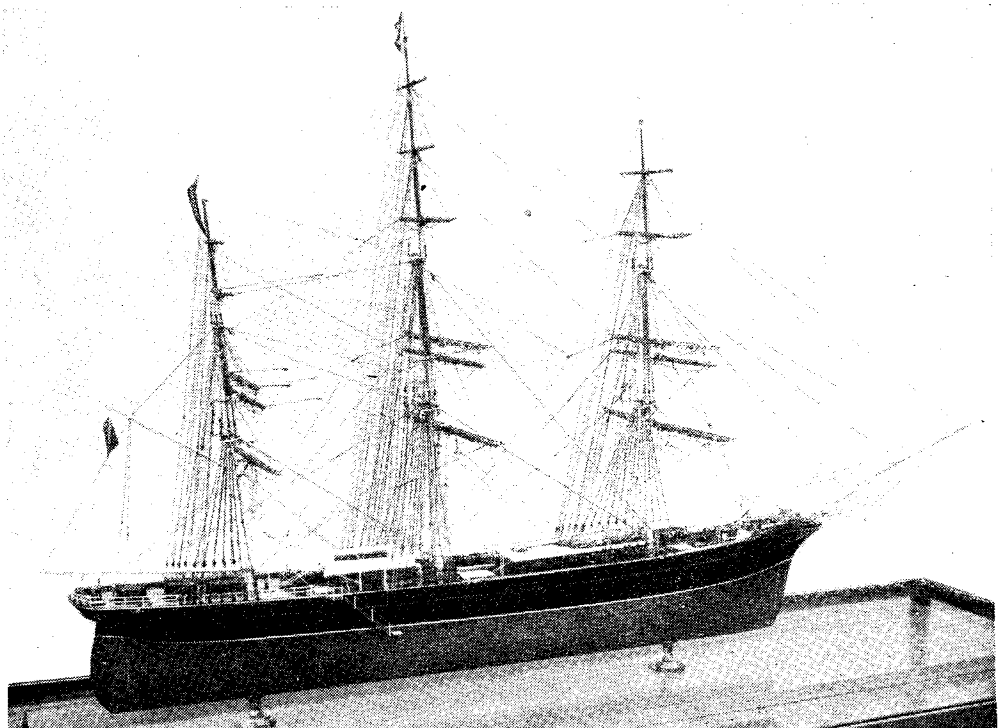
Ship Models at "The Show"

by "Jason"

I HARDLY expected that my prophecy would come true so soon. The miniatures and the one-foot-scenics have swept the board this year so completely that larger scale steamers are non-existent, apart from half a dozen war-time service launches and a similar number of other power boats. Calm reflection will tell us why. Most of the services personnel are just a year free. At the most, even for the earliest, scarcely two years have passed by. Shall we say that eighteen months is much too short a time for the bigger scale steamers and sailing ships. We can therefore expect next year the first of the post-war big chaps. Another cramping item of big scale models is that of the housing shortage. There are many "in-laws" sharing the kitchen table and the spare rooms. Materials are a serious problem in big stuff and the past twelve months' crises in series have had their effects upon temper and temperament. A couple of months' Shinwellian weather in the winter was not conducive to the artistic sense and touch.

Many visitors will be surprised to know that there were quite 20 per cent. more entries this year than last year. Two reasons mainly contributed to this wrong impression. More space was available and consquently the models were displayed in a manner which allowed easier examination. The main reason, however, why many thought that entries were smaller in number this year was the absence of many larger scaled models.

It was natural to expect that in the larger numbers of the one-foot-scenics the competition would be exceedingly keen. It was keen—needle-point keen. Sail entries in the bigger scales was disappointingly small, but this was compensated for in the excellent model of the *Norman Court* backed up by a very fine model of *Sir Lancelot*. Both of these were to a scale of $\frac{1}{8}$ in. to the foot. I'll be describing these in more detail later on, but it really is interesting to note that Mr. Marsh (*Sir Lancelot*) has been a contestant for nearly a quarter of a century, but the Champion's Cup has just missed him every time. He was very unlucky this year to come up against



The winner of the Championship Cup for Sailing Ships. The clipper ship, "Norman Court" to a scale of $\frac{1}{8}$ in. to 1 ft. by John F. Alderson of Pontypool, Mon., and formerly of the Ilford Ship Model Society. A timbered and planked hull and copper sheathed; the copper plates are "one thou." thick

Norman Court. Before passing on to a general examination of this year's entries, I must place on record some impressions. The first one is the national appeal of the Exhibition, and I feel sure that all modellers will sympathise with our Clydeside and Scottish friends. Their exhibition models were on show in Kilmarnock recently. A fire broke out and damaged or destroyed most, "teak" rails on the promenade decks. Take, for example, his ladders passing from one passenger deck to another. They were the usual teak—treads and sides, with the correctly-curved *white* handrails. At 50 ft. to 1 in. the distance from one step to another is 1/60 of an inch, yet the white handrail *was* white and the "teak" *was* "teak" in colour—clean cut and definite.

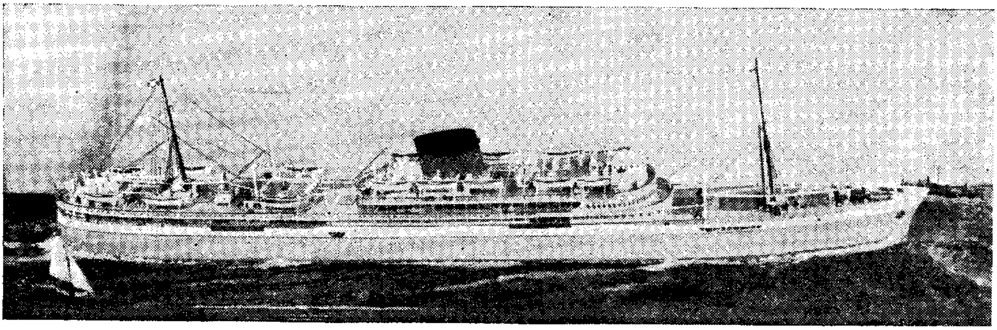


Photo by] [M. B. Craine

Winner of the Steamer Championship Cup, the Union Castle Liner "Stirling Castle" (1/50 *in. to* 1 *ft.*) *by D. McNarry (Barton-on-Sea, Hants.). Model* 14½ *ins. long. A really fine piece of work.*

if not all, of them. Hard luck! Glasgow! London has had to meet a really tough challenge nevertheless. Bristol, South Wales, Liverpool, Sheffield, Hampshire, have all participated in securing major awards.

I will, of course, deal with the individual entries in the course of these notes.

Another impression is the strong entry of really good work in the miniatures and the one-foot-scenic models. The judges scrutinised long and carefully at the three leading contestants for the Steamship Championship Cup. Each of them was the acme of craftsmanship in finish, detail, and setting, but the judges did finally agree on the champion, *viz.* D. McNarry, of Barton-on-Sea, Hants. with his Union Castle liner, *Stirling Castle*, to a scale of 50 ft. to 1 in. This model, like its two close competitors, had to be seen to be believed.

I'll deal with the *Stirling Castle.* The model is 14½ in. long. It is decked, i.e. one can see through under the several decks. The modeller himself is a cashier and has no workshop. He got the plans from the builders and the photographs from the Union Castle Line.

It is an excellent example of selection and rejection of detail. He has kept rigorously to scale in all the included details. Not far away was a model to a similar scale and on this model there was a small signal yard which is *4 ft. thick*, i.e. more than half the thickness of the boats. On the champion model there are no such grotesque mistakes. Although the windlass is to scale, Mr. McNarry has hollowed out his drum-ends. The fairleads are patiently made with the cleat lug each end and the round bollard in the middle.

The flags were cleanly marked, coloured and curled. The Royal Mail pendant was clearly discernible as such. I particularly noted the neatness of his rails along all his decks. One does not expect to see in this scale the luxury of

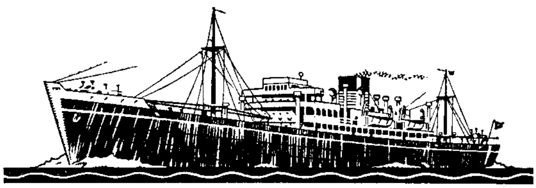
The *Stirling Castle* was ratlined down (sailors say "rattled down," by the way) with due care to scale. His lifeboats were uncovered, showing thwarts, sail, and mast, with equipment. Moreover, the strongbacks were in position and the canvas covers were furled lazy fashion. I was pleased to see that Welin MacLachlan gravity davits were shown. Why do some modellers show a wireless aerial ½ in. in diameter and leave out such things as davits 6 or 12 in. thick?

One could look under the decks with some curiosity. Glazed portholes and doors (some open) were there. Big square windows to the lounges were correctly scaled.

The *Stirling Castle* was a waterline model and the sea setting was good, showing, say, a speed of 12 knots, with an A.S.R. launch showing off her paces on the port bow and a small sloop-rigged yacht of the "comfortable" class on the starboard quarter. These touches declare Mr. McNarry to be something of a showman as well as an artist and craftsman. Well, I've given quite a faithfully-described picture. Mr. McNarry is indeed lucky to win the *Steamer Championship Cup*, but he fully earned the very highest possible awards in small scenic and miniature class work. Hearty congratulations, Mr. McNarry.

Well, what about the *Sailing Ship Championship Cup*? Those of you who have long memories for such things may remember an unfinished hull of the clipper *Norman Court* just ten years ago on exhibition as a loan exhibit. It was a hull only, a timbered and planked affair. Even in those days the best work was not fully apparent to the visitor—the bow and stern timbers and framing, for example. Yet all could see the magnificent panelling along the bulwarks. Those who were lucky enough to look at that hull under guidance could see some really fine craftsmanship in wood. Every item is hand made.

(*To be continued*)



*The 36 in. model cargo-passenger liner "PENANG"

by L. W. Sharpe

MODEL shipbuilders with access to sheet-metal of 22 or 24 s.w.g., may prefer an all-metal hull, and a miniature vessel with correctly marked shell plating certainly gains tremendously in realism. In the short space at our disposal, it is not possible to go deeply into the subject, so I will try to give as many practical pointers as possible, particularly on the for'ard and aft ends, because these are most likely to produce the snags.

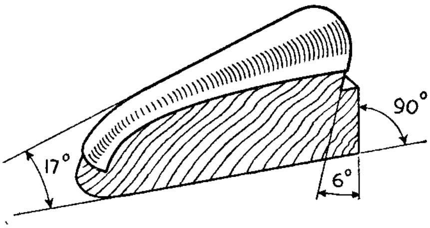


Fig. 10. *Stem plate former*

The increasingly popular round-nosed raked stem is, in my humble opinion, a rather easier proposition to make than the older straight and sharp variety, because it starts off with a dished plate which forms a very convenient "land" with which to cover the ends of the bow plating. The only drawback is the necessity of making a hardwood former to shape the plate, as shown in the illustration (Fig. 10). If the angles of the former are kept to the figures given, the plate should come out fairly accurately with the designed rake and sheer. It will be noticed that the apron is not included in the sketch, because it extends some distance aft and might be an awkward customer to line up with the sheer, and on many vessels is a separate plate. Builders who prefer to incorporate it will find no difficulty in trying this method out. The aft points of the apron are about 1 in. from the stem front, and a tie-plate covers half the apron (see Fig. 1). These aprons, by the way, nearly always have a half-round moulding outside their top edges, and the same applies to the whole of the raised fo'c'sle deck. The radius of the stem at deck level should be about ⅜ in., which diminishes as it travels downwards to the water-line, and increases at the forefoot to receive the garboard strakes and flat keel plate. Just how far aft one extends the stem plate under the fore-foot is a matter of convenience and preference. Full size shipbuilders fit a separate *shoe plate*, rounded at the top and flat at the aft end.

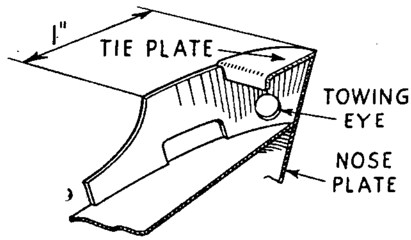


Fig. 11. *Half-section of stem apron*

The first essential in a metal hull is a good strong keel of rectangular brass, ⅜ in. × ¼ in., laid on edge and bent to shape by saw cuts where necessary, which are afterwards filled in with silver or soft solder (see Fig. 12). Two or more brass strips let into the stem, soldered and bent to the correct radius will make a good base for holding the strakes, and finally, the nose plate, but slots of the right depth to take these strips should be cut in the former so that the nose plate contour is correct. If a central channel is also cut in the former it will make a useful gauge when bending the keel, or as it becomes here, the stem.

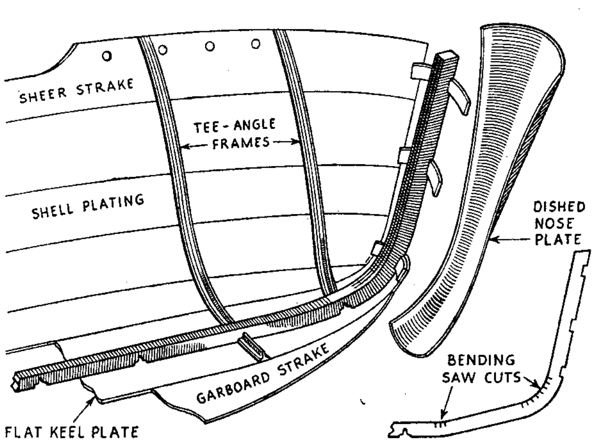


Fig. 12. *Forward assembly details*

Frames and Beams

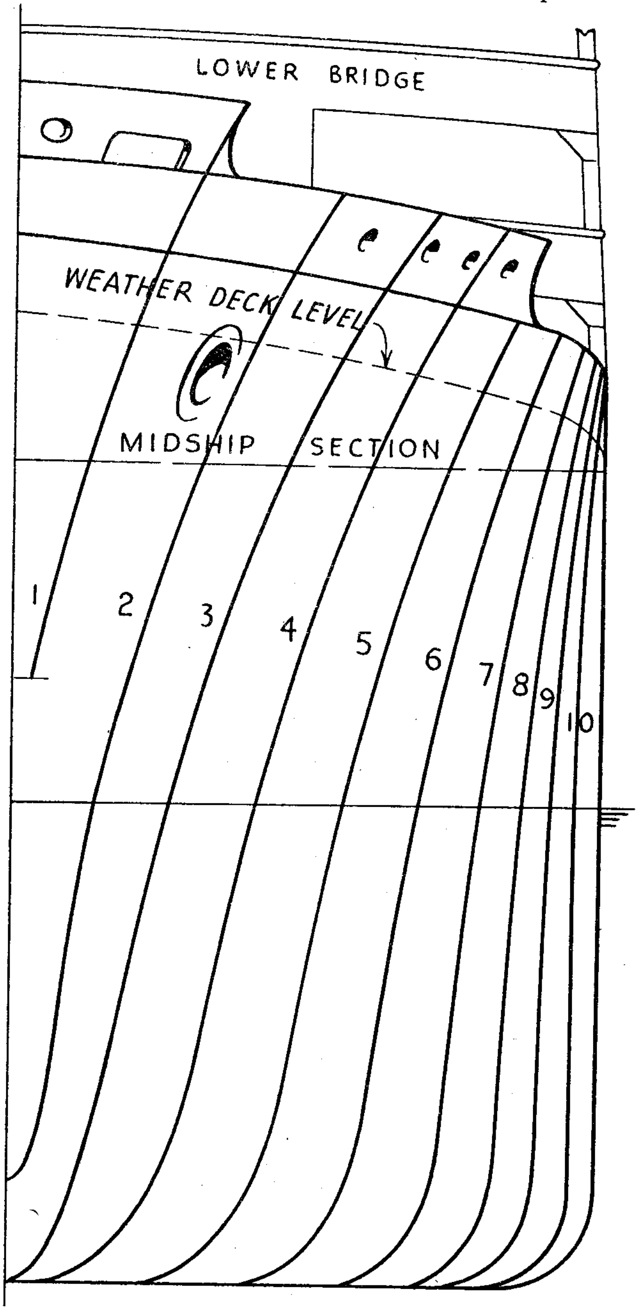
The frames and beams are made of $\frac{3}{16}$-in. tee-

**Continued from page* 271, "*M.E.*" *September* 4, 1947.

section brass or $\frac{3}{16}$-in. brass angle, whichever is obtainable, bent to the shapes shown in the full-sized half-sections, Figs. 13 and 14, and let into filed slots under the keel. My friend Mr. A. C. Palmer, builder of the well-known tug *Superman*, fits his frames on top of the keel, which thereby becomes what shipbuilders term a "bar keel," but nowadays this has been superseded by the flat plate keel on all but the smallest vessels. From a model point of view, it is largely a matter of deciding which is likely to sustain the least damage, for a bar keel projects below the bottom and could be knocked out of alignment. The other type means, of course, a projection inside the hull, but it is unlikely to make any difference to engine and boiler mountings and might be useful for lining up operations. The methods of fitting tee-section or angle beams to the frames are illustrated, in one case it means cutting a slot and filing a web, in the other filing away one side of the angle bar, in each case silver- or soft-soldering the joints. The strakes of plating should be carefully chamfered with a file, and the resulting vee slot filled with solder, and also the frame edges as shown; to make the structure rigid it will be necessary to fit gussets, or to give the correct technical term, beam knees. I have also shown how the shipbuilder fits these beam knees, and it will be noticed it is not considered necessary to cut the beam angle, merely abutting it to the frame angle. This is an instance where the model builder can use his own discretion. One point about prototype frames occurs which we can include here. Those forward of the midship section have their frame sides extending aft, those aft of amidships extend forward. This allows the angles to be extended more than 90 deg., so that athwartship bulkheads on the fore and aft ends can be riveted to the flat surface. A "mixed grill" illustration, Fig. 15, shows all the above points.

Number of Beams?

As to the number of beams to be fitted, this depends so much upon machinery layout that it must be left to individual requirements. Frames every 2 in., with, perhaps, two or three every inch at bow and stern to facilitate bending the shell plating should be ample. Where beams cannot be taken right across the vessel because of engine or other obstructions, it is safer to fit beam knees, which will afford a measure of support for the deck, or better still, deep brackets as wide as engine space will allow. These deep brackets,



PENANG'S FOR'D SECTIONS.

Fig. 13

or to give their correct term, web frames, are shown aft in the overall perspective sketch of the hull structure (Fig. 16), which also gives an idea of the boiler feed tanks, the bridge, with openings for the fuel tank (to be dealt with later), No. 3 hatch, the engine-room casing, and the after deck, which will probably be easier to handle as a separate sub-assembly.

The Stern

Now for the stern (see Fig. 17). To show the approximate shape of the afterpart more clearly, I have sliced the drawing in two horizontally, but actually, of course, the shell plating will conform to the full size frames already given (Fig. 14). It may be an advantage to use a temporary wood former again as an aid to getting the strakes nicely rounded at the extreme stern end, but this is another matter which calls for individual preference.

Fig. 17 is a diagrammatic illustration, showing the stern frame, which can be cut from $\frac{3}{16}$-in. brass plate, two floors set up on half slots in the keel, and the approximate position of the lower strakes. It will be seen that the latter start from the flat "landing" surface of the stern frame and immediately start to curve outwards to the contour of the floors. The shipbuilder would call these *solid floors*, and for those who like to know the ins and outs of shipyard terms, floors are the vertical athwartship plates connecting the inner and outer double bottom, and not the plating one walks upon in the hold. If it is decided to extend these plates, and two others right forward up to the fo'c'sle and poop deck, as shown in the hull structure sketch, they could be made watertight bulkheads. This sketch also includes a section through the lower rudder pintle, which can be riveted if preferred, and a stealer plate, to be dealt with later.

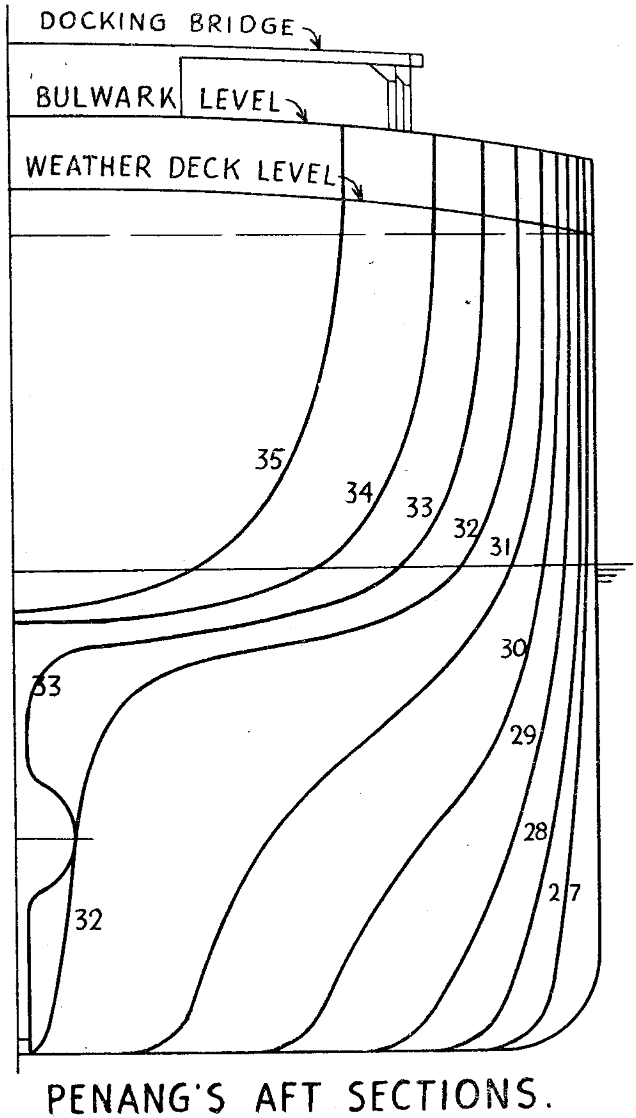


Fig. 14

Frame Contours

The underside view of the stern (Fig. 18), shows a strip of plating running from the stern frame to the poop bulwarks, which acts in a similar manner to the stem plate. Some builders may prefer to extend a keel bar of a little lighter section than $\frac{3}{8}$ in. $\times$ $\frac{1}{4}$ in. from the top of the stern frame and then bend the strakes round it. The dotted lines in this illustration are intended to give a rough impression of the frame contours and both these sketches show a coffin plate which shipbuilders fit here, and performs the same service as the shoe-plate at the forefoot. A suitable length of brass tubing forms the stern tube, and plenty of ingenuity and good fitting, with a rat-tail file will be needed where it projects through the plating at the propeller-boss end. It will be necessary to build up the stern frame for the boss, afterwards filing to shape. If it is decided to fit watertight glands, the stern tube must be tapped before fitting, but glands can run away with a lot of power, and well fitted plain bearings, properly lubricated, will cut down leakage to a very small amount.

The top edge of the stern frame will be soldered to the hull plating, with a fairly generous fillet each side. If the holes for the rudder

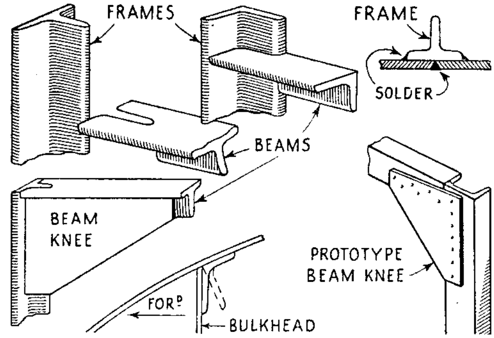


Fig. 15. *Frame and beam joint details*

pintles are drilled in the gudgeons at this stage, see that they come vertically under each other, and are only just big enough to take a length of straight steel wire (a cycle spoke is useful),

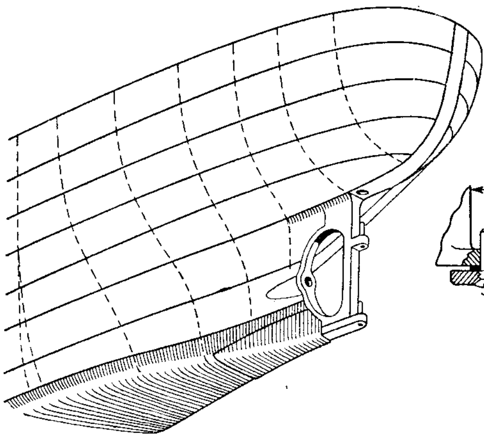


Fig. 18. *Underneath view of stern plating*

which will come in handy later for locating the rudder stock and probably the holes above if the stock extends through the poop deck and after deckhouse.

Jig for Plating

Plating is best done with the hull bottom up, the first essential being to set the keel and frames up; and some form of wooden jig will smooth out many difficulties. Methods are many and varied, so I will give the bare essentials on which readers can base their own ideas according to the wood at their disposal. A working bench or plank with a *true* surface is required, and a second plank (two or more if one of the right thickness is not available) shaped to deck contour at the ends and

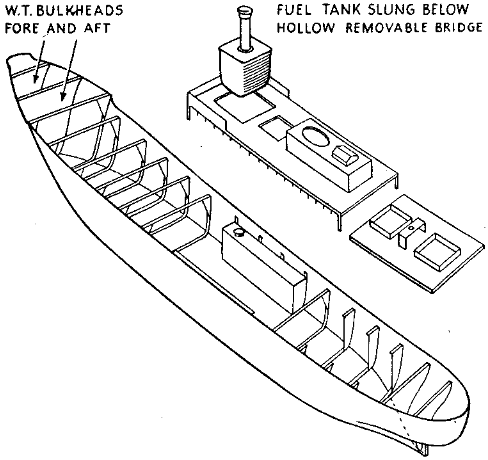


Fig. 16. *A bird's-eye view of the hull*

deep enough to give the maximum sheer, which is 1 3/32 in. if one includes the apron and $\frac{13}{16}$ in. if the fo'c'sle deck only is required.

(*To be continued*)

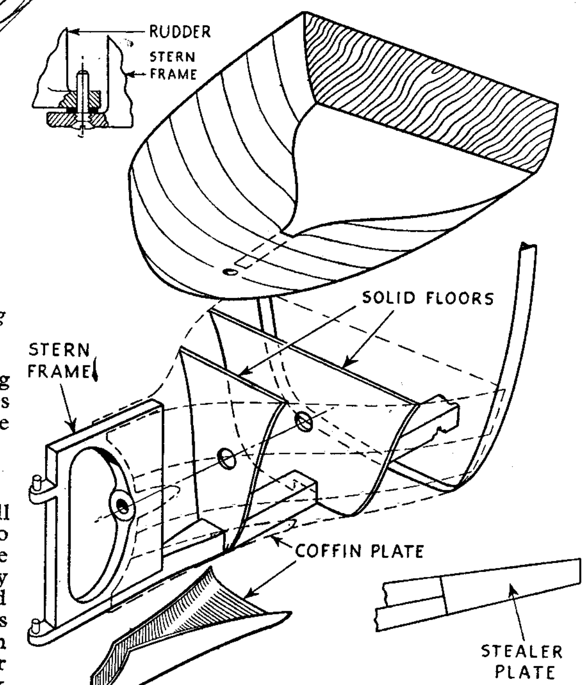


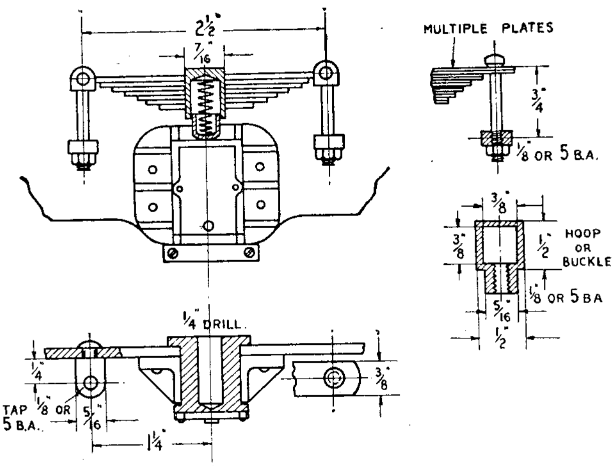
Fig. 17. *How stern frame, floors and shell plating are set up*

"L.B.S.C."

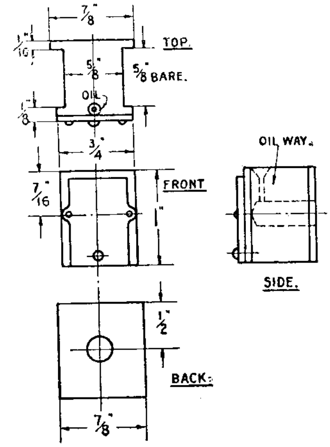
TENDER DETAILS FOR "HIELAN' LASSIE"

IT is quite possible that by the time these notes appear in print, complete cast tender frames for the "Lassie," with cast-on dummy springs and horncheeks, will be available for all those good folk who wish to cut the work to the minimum. In any case, cast dummy tender-springs and horncheeks are already available, and I have made the drawings to suit these. They are not exactly "to scale," and our old friend Inspector Meticulous might be able to detect a slight difference in design, from the corresponding parts of a full-sized engine; but they look perfectly "L.N.E.R.-ish" and do the job, so I guess there's nothing to fret about!

Very little machining is required. The sample from which I made the drawing, didn't even need cleaning up with a file externally, the jaws formed by the two horncheeks only needed a milling cutter running through. Even a flat file, judiciously applied, would have smoothed off the slight roughness and left a perfect contact for the sides of the axlebox. The springing is exactly the same as described for the trailing axleboxes of the engine; the hoop or buckle is drilled $\frac{5}{16}$ in., and a hollow plunger or headless buffer turned from brass rod, to slide in it, as shown in the section. A spring wound up from 20-gauge tinned steel wire, fits into the cup. This arrangement works far better, and is more realistic than using an open spring, with an "apron" on the front of the hoop to hide the spring from view. The cast springs are attached to the frames by $\frac{1}{8}$-in. or 5-B.A. screws put through No. 30 holes drilled in the lugs at each end, and through the frame-plates, the screws being nutted inside the frames; the position of the springs is shown in the general arrangement drawing reproduced with the last "Lassie" instalment. The bottom of the hoop should be about $\frac{1}{16}$ in. above the top of the opening for the axlebox, and, of course, central with it. The horncheeks are riveted to the frames by 3/32-in. round-head charcoal-iron or steel rivets if available, as they keep tighter far longer than copper rivets. I always jam a bit of bar in the slot, butt the horncheek tight up against it, hold it in place temporarily with a toolmaker's cramp, then drill the holes and put in the rivets. By that means, the horncheeks and openings *must* line up correctly, as it is not possible for them to do anything else!



Springing details



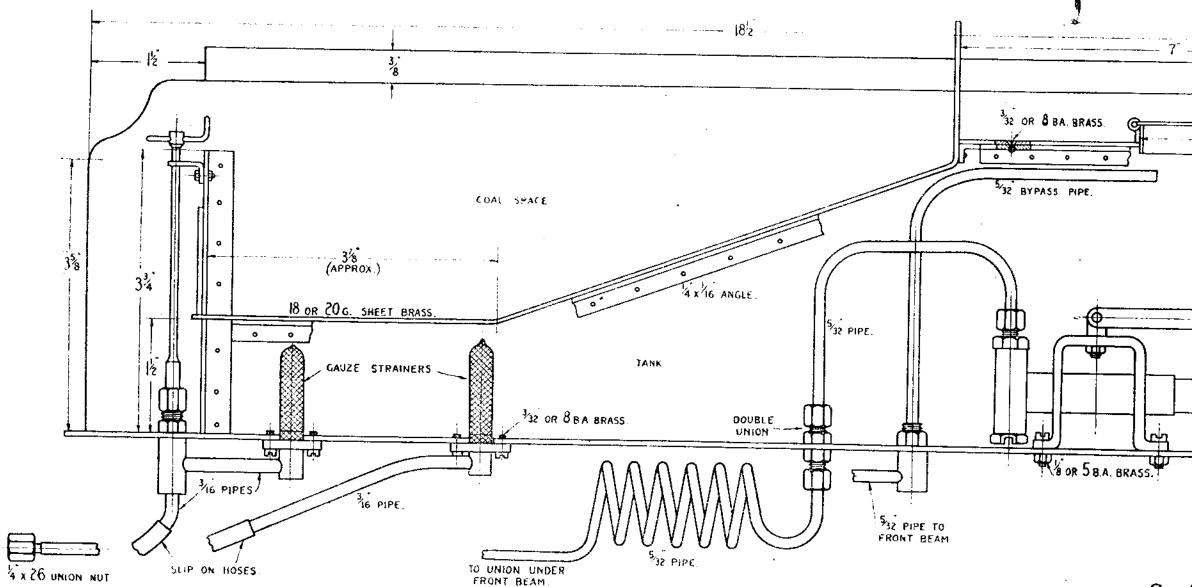
Tender axleboxes

Alternative Working Leaf Springs

If anybody likes to take the trouble to make working leaf springs, it is really worth while, because the tender then rides very steadily, and the action of the springs is very fascinating to watch. I recommend Mr. Tom Glazebrook's system, in which each plate is built up of two or more laminations, which gives the correct appearance of full-size springs, with the flexibility needed for smooth running over the average back-garden or club track, neither of which in any way approaches the full-size article, in either horizontal or vertical alignment. All of those I have seen, are just a succession of "'umps and 'ollers," with gaps between rails that would throw any full-sized engine off the road in double-quick time. The plates could be built-up from spring steel $\frac{3}{8}$ in. wide and 26-gauge thick, which is a commercial article, four thicknesses being used for the top plate,

and three for the others. The top plate should be $2\frac{7}{8}$ in. overall length, with $\frac{1}{8}$-in. holes punched in it at $2\frac{1}{2}$ in. centres ; the punch should be turned from a bit of $\frac{1}{4}$-in. round silver-steel, the business end being only about $\frac{1}{4}$ in. long, but backed off so that it doesn't bind and split the end of the spring, after being driven through. Harden and temper to dark yellow, same process as described for injector cone reamers, and be sure the end is ground off dead flat. If the spring is placed on a flat block of lead, the punch held vertically on

about $\frac{3}{16}$ in. long, and part-off at $\frac{7}{16}$ in. from the shoulder. Round off the end, and drill and tap a hole $\frac{1}{8}$-in. or 5-B.A. at $\frac{1}{4}$ in. from the shoulder. Poke the stems through the No. 30 holes already in frames, and rivet over at the back, as shown in the plan sketch. Make the heads flat enough to clear the wheels. The spring pins are the same as already described for the trailing axle-boxes of the engine, so I needn't detail them all out again ; they are screwed through the brackets and lock-nutted underneath, as shown.



Secti

it at the desired spot, and the butt given a sharp crack with a hammer, the result will be a clean hole through the steel. I've punched hundreds of gramophone governor springs thus, in days gone by when I had the time available to repair gramophones, and I often used to chuckle at the accounts published in this journal, of how makers of laminated springs carefully made an indentation with a centre-punch, filed off the little bump on the other side and then enlarged the hole by instalments with a rat-tail file or other implement, taking about half-an-hour or so for each hole !

The hoops for the leaf springs are shown in the little detail sketch ; the round part can be turned, drilled and tapped with the $\frac{1}{2}$-in. square rod held truly in the four-jaw. Part-off at $\frac{3}{4}$-in. from the end, then drill a $\frac{3}{8}$-in. hole through the square part, and file it square, finishing the outline to the dimensions given. The nest of plates should fit tightly in the hoop, and they are secured by a grub-screw—or, preferably, an Allen screw—driven as tightly as possible into the tapped hole in the stem.

The brackets for the spring hangers are made from $\frac{1}{8}$-in. by $\frac{5}{16}$-in. mild-steel rod, chucked truly in the four-jaw. Turn down a $\frac{1}{8}$-in. pip

Axleboxes

Advertisers will probably supply cast boxes in a stick, and the groove or channel in each side can be milled as described for the axleboxes on the engine. The fit should be fairly easy, as there is no driving thrust to cause undue wear, and the axleboxes should be free to " follow the road " as easily as practicable, though they should not, of course, be sloppy. If castings are not available, the axleboxes can be made from $\frac{7}{8}$-in. square brass bar ; a good quality of brass is desirable, but even " screw-rod " may be used at a pinch, and bushed with bronze as soon as any wear is apparent. The cast boxes will be complete with dummy lids, but boxes made from bar can either have dummy fronts cut from $\frac{1}{16}$-in. sheet brass and soldered or screwed on, or they may be made detachable, two grooves being cut in the small side lugs, to slip over two small screws in the axlebox. In the latter case, the oil-hole is left out, and the journal hole drilled clean through the box ; oiling is then done by lifting the lid, and applying the spout of the " driver's bosom pal " direct to the journal in the box. The horn-stays are merely strips of $\frac{3}{16}$-in. by $\frac{1}{16}$-in. steel, 1 in. long, attached to the projecting part of the frames below the horn-

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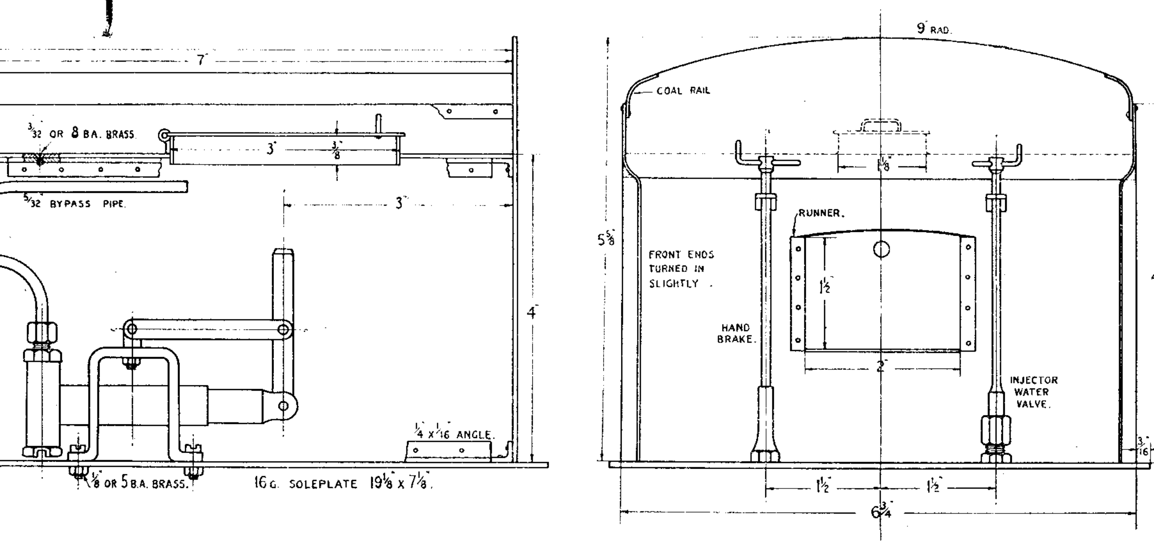
cheeks, by a 3/32-in. or 8-B.A. screw at each end. Hexagon or round-head screws look best. Beginners remember that the axles must run perfectly free when the boxes are moving up and down, following irregularities in the road, and, therefore, the journals must be an easy fit in the axleboxes. Brake gear can be added if desired, and I will give the necessary notes and sketches for a tender handbrake, all being well, after the body is made and fitted.

runner, similar to that on the cab roof, is riveted by pieces of thin brass wire or domestic pins. A piece of metal is cut to slide in the runners and form the coal-gate, as shown in the end view; it is furnished with a small knob for lifting purposes. This is *not* L.N.E.R. style (actually, it is L.B. & S.C.R.) but it is the handiest type I know of, and easiest to make. The complete front is riveted between the tender sides at $1\frac{1}{2}$ in. from the front end, angles pointing backwards, as shown. For this job, and riveting all the brass



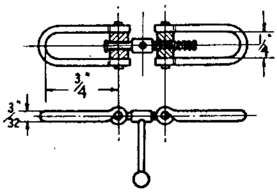
Section and front end of tender

Tender Body

The bottom of the tender, or soleplate, is a piece of 16-gauge brass or copper sheet measuring $19\frac{1}{8}$ in. by $7\frac{1}{8}$ in. It must be perfectly flat, and is attached to the tops of the beams, and to the angles at the top of the side frames, by $\frac{1}{8}$-in. or 5-B.A. screws (any head will do) passing through clearing holes in the soleplate, beams, or angles, and nutted underneath, which allows easy removal of the whole bag of tricks in case of necessity. Three screws in each beam, and two in each angle, will be ample.

The tank sides are made from 18- or 20-gauge sheet brass, each side needing a piece $18\frac{1}{2}$ in. long by $4\frac{3}{4}$ in. wide. Hard-rolled brass is most suitable. The front ends are rounded off as shown, and slightly curved inwards. The back is cut from the same material, $6\frac{3}{4}$ in. wide and $5\frac{5}{8}$ in. high, the top being rounded off to 9 in. radius. The sides are attached to the back by a piece of $\frac{1}{4}$-in. by $\frac{1}{16}$-in. angle riveted into each corner. The front plate is a piece of the same kind of metal as the sides, $7\frac{1}{2}$ in. long by $3\frac{3}{4}$ in. wide; $\frac{3}{8}$ in. of each end is bent at right-angles, to form a flange for riveting to the tender sides. A rectangular hole $1\frac{1}{2}$ in. by 2 in. is cut $1\frac{1}{2}$ in. from the bottom; and at each side of this, a angles, I recommend $\frac{1}{16}$-in. soft brass round-head rivets, heads inside, countersunk and filed flush outside. Curly loves to see nice smooth platework! Some folk, of course, prefer to see rows and rows of roundhead rivets all over the platework; everybody to their own taste, naturally, but at the same time I guess that if they had ever cleaned a big engine with knobs all over her (and when I say " cleaned," I mean just that; cleaned in the sense that the old " Brighton " cleaner-boys understood) they would soon prefer flush rivets and smooth plates! The body can then be placed on the soleplate, and checked for truth, square corners and so on. When O.K., rivet a piece of $\frac{1}{16}$-in. by $\frac{1}{4}$-in. angle all around the bottom, and along the back at 4 in. from bottom. At the same level, rivet a piece $6\frac{3}{4}$ in. long, along each side; these angles support the removable part of the tank top. Mark-off the outline of the bottom of the coal space, and rivet in pieces of angle to support the sloping part of the tank top, which forms the bottom of the coal bunker and carries the black diamonds; these angles are shown broken, in the section of the complete body. The sides and back, thus far assembled, may then be mounted on the soleplate, and fixed by rivets through the bottom

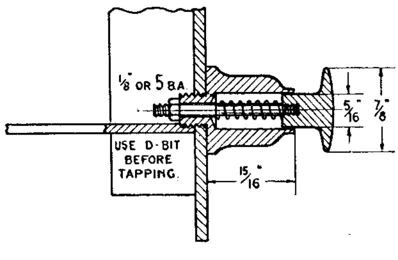
angles, or screws, just as you prefer. Finally, solder all around the inside, along the bottom, covering all the angles and screw-heads, so that the tank is perfectly watertight. Any solder that seeps through to the outside, should be removed with a scraper ; I use an old flat file with the teeth ground off at the end, and it makes a swell job of removing solder.



Screw coupling

Fixed and Removable Tank Tops

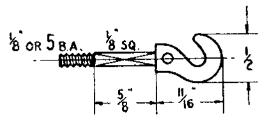
The fixed part of the tank top, forming the coal space, is made from a piece of 18- or 20-gauge sheet brass a bare $6\frac{5}{8}$ in. wide and $12\frac{1}{2}$ in. long. This is rounded off at one end, similar to the back, and then bent to the shape shown in the section of the body, so that it rests on the angles. The front end is cut to leave a little tongue which projects through the coal-gate opening for about $\frac{3}{16}$ in., and forms a shovel-plate for the fireman ; it must also be nicked on either side, to fit between the turned-in ends of the front plate. At the bottom of the vertical part, rivet a length of $\frac{1}{4}$-in. by $\frac{1}{16}$-in. angle, to form the support for the front end of the removable plate ; see section. When you have the whole doings nicely fitted, attach it to the supporting angles by a few small brass countersunk screws (any size, within reason, that may be handy) and then solder over the lot, to make it watertight. Don't forget to solder under the tongue projecting through the coal-gate ; it is easily overlooked !



Buffer

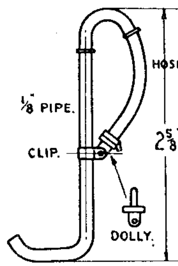
The removable part is a very easy job ; simply cut out a piece of brass sheet to fit in the open part of the tank, and rest on the angles. Starting at $1\frac{1}{2}$ in. from the back, cut a rectangular hole, 3 in. long and $1\frac{1}{8}$ in. wide, with rounded corners. This is the filling hole, and needs to be fairly large, so that the hand-pump lever can be operated through it in emergency ; also a big hole is a great advantage when filling, as you'd soon realise if you had to pull up at a wayside station and take water whilst passengers were getting off and on, and only a two-minute booked stop on a tight schedule.

Well, getting back to the job, solder a little brass wall all around the hole, projecting $\frac{1}{4}$ in. above the plate, and fit a lid to it, made of 18- or 20-gauge brass, with a hinge just as I described for "Juliet's" tank lids two weeks ago, plus a wire lifting handle as shown. Drill No. 40 or 43 holes all around the edges of the plate, at 1 in. spacing, and 5/32 in. from the edge ; the plate can then be attached to the angles by 3/32-in. or 8-B.A. brass screws, either round-head or countersunk. Drill and tap the screwholes, but don't put any screws in yet, because the top is not attached "for keeps" until the pump and by-pass pipe have been fitted. For 3/32-in. screws, use No. 40 clearing and 48 tapping drills ; for 8-B.A. (slightly smaller and neater) 43 and 51 respectively.



Drawhook

The coal-rail at each side requires no detailed instruction, as it is merely a strip of metal 17 in. long and $\frac{7}{8}$ in. wide, bent to a curved section, as shown, and riveted along each side of the tender side sheets.



Brake pipe

How to Erect the Pump

Fetch out the hand pump which you made for testing the boiler, set the lever vertical, and place the pump on the centre-line of the tank bottom, with the lever 3 in. from the back end ; then attach pump to soleplate by four $\frac{1}{8}$-in. or 5-B.A. brass screws passing through clearing holes in the soleplate, and nutted underneath. At any convenient place in the soleplate between the two middle axles, drill a $\frac{1}{4}$-in. clearing hole, and in it fit a double-ended union like the one connected to the left-hand clackbox on the engine, except that both ends are countersunk and both ends screwed $\frac{1}{4}$ in. by 40. Poke the longer end through the hole in the soleplate, from the inside, and put the nut on underneath, screwing it tightly enough to prevent any water leakage, but without stripping the threads. Connect the inner end of the double union, to the union on top of the pump valve box, by a piece of 5/32-in. pipe with appropriate union-nuts and cones on each end. I've explained how to make these, so many times, that even beginners should be able to do the job upside down and backwards, with their eyes shut ! It takes roughly one minute apiece to make union nuts on an ordinary lathe, after a little practice ; I usually make a lot at the time.

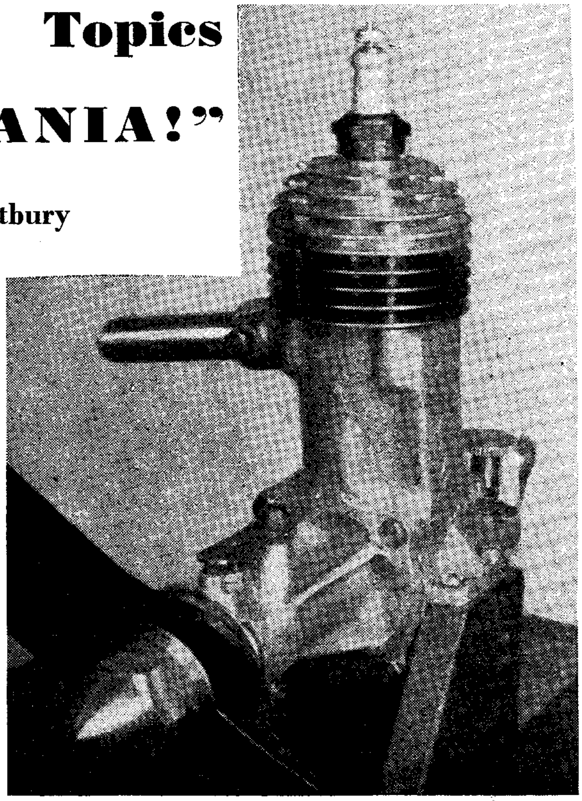
A little way ahead of the pump, drill another $\frac{1}{4}$-in. clearing hole in the soleplate, for the by-pass fitting. Chuck a bit of $\frac{3}{8}$-in. round brass rod in the three-jaw ; face the end, centre, and drill down about $\frac{3}{4}$ in. with No. 23 drill. Turn down $\frac{5}{16}$ in. of the end to $\frac{1}{4}$ in. diameter, screw $\frac{1}{4}$ in. by 40, and part-off $\frac{9}{16}$ in. from the shoulder. Drill a No. 23 hole in the side, close to the bottom, breaking into the centre hole. Make a $\frac{1}{4}$-in. by 40 nut about $\frac{1}{8}$ in. thick. In the longitudinal hole, fit a piece of 5/32-in. pipe about

(*Continued on page* 303)

Petrol Engine Topics

"DICYCLOMANIA!"

by Edgar T. Westbury



The 6-c.c. " Atom Minor " Mark III engine

NO, don't trouble to look it up in the dictionary—you won't find it; neither has it been newly coined by the pundits of the pathological sciences, who delight to spring upon us obscure and fearsome new names for equally obscure and fearsome new diseases. But the term —which, by the way, I have produced single-handed to meet the exigencies of the occasion (" a poor thing, but mine own ! ")—does indeed refer to a disease, or, if you will, a mental disorder, which is very prevalent at present among model engineers; namely, an obsession on two-stroke engines as the one and only source of motive power for model aircraft, cars and boats, and likewise the only object for construction, design and discussion among I.C. engine enthusiasts.

I have suffered from this disease in the past myself, though by no means so intensely as many of my correspondents, who are liable to become extremely violent if I spend much time on any other type of engine than a two-stroke. On many occasions in the past few months, I have been reminded that it is a long time since I gave readers a new two-stroke design, and " what am I going to do about it ? "

Avoid Dogma

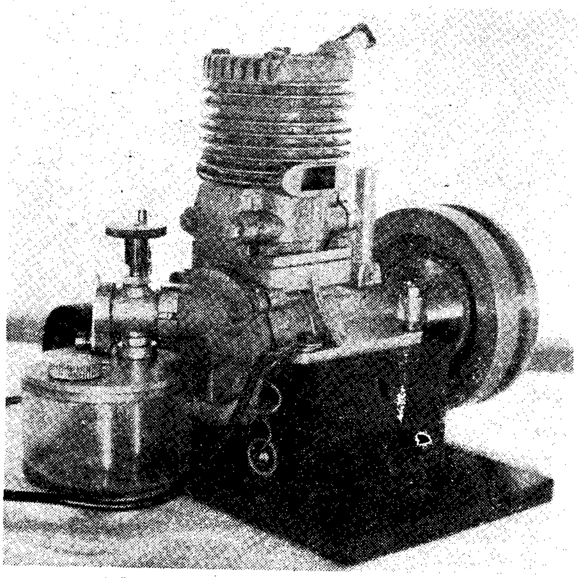
Do not think for one instant that I condemn the attitude of these ardent two-strokists, or wish to preach to them on the error of their ways. In model engineering, the one thing to avoid is dogma; the enthusiast need harbour no inhibitions, or be fenced in by limitations of conventional practice, and what he thinks or does is always right—so long as he gets interest and satisfaction from his hobby. While I do think that one should never be too much of a hyper-specialist, or regard one type of model as the be-all and end-all of model engineering—a creed which I have attempted to put into practice by designing engines of widely diverse types and varied detail—I am, and always have been, out to satisfy the demands of readers in so far as this is possible. If readers want two-stroke engine designs, they shall have them; and if new designs are not forthcoming quite as quickly as some readers might wish, the reason is not my unwillingness to comply with demands, but simply human limitations.

There is, of course, a limit to variety and originality in engine design, but a still greater restriction is imposed by the time taken to try out new ideas, and incorporate them in a well-ordered and sound form of construction. Designing an engine is not simply a matter of drawing something which looks very nice on paper, though I do not deny that some success might be attained in this way if one keeps strictly to traditional and well-tried features of design. Neither is it progressive to alter details just for the sake of being different, or to " ring the changes " on existing designs by alteration of size and proportions. I have, on one or two occasions, been persuaded to resort to these expedients to comply with urgent demands—" Please do let us have an umpteen-c.c. version of your 'Whatisit' engine "—but generally speaking, each new design I offer readers of THE MODEL ENGINEER is the result of a definite line of experimental investigation, in which new problems arise and have to be dealt with before the engine can be passed as a success.

Readers have often criticised my " ca' canny " policy in the progress of design, and exhorted me to go all out with really " advanced " types of engines; but quite apart from the difficulty in evolving such designs experimentally—as distinct from merely putting them on paper—I have to consider the fact that many of the readers who will wish to construct these engines have had no previous experience, and would be

all at sea with a design far removed from conventional practice. One simply cannot design engines for the expert—he would almost certainly disagree with the designer on some of the most important details, or even the fundamental principles of design, and in any case he is, or should be, equally capable of producing an advanced design for himself. I delight in seeing new and up-to-date designs of engines, in which the latest practice or high efficiency principles are incorporated, but I feel sure that it would be a mistake to present designs of this nature to the reader of average ability.

Do not imagine that all the ideas I try out in engine designs are instantly, or even ultimately, successful; my workshop is literally packed with engines and components which have failed to fulfil expectations, and have been discarded either permanently, or pending either more time for experiment, or fresh inspiration to deal with the new problems they present. Some day I may describe some of these “problem children,” and the headaches they impose; but although it is often urged that much useful knowledge would be gained by the airing of failures in public, I have found that many of my readers regard any admission that some of my ideas do not work, almost as bad as a confession of moral delinquency.



The “Ensign” 10-c.c. racing engine

New Two-Stroke Designs

Although it is a long time since I described a two-stroke engine design in THE MODEL ENGINEER, I have by no means neglected progress in this direction, and for the benefit of readers who do not already know it, I may call attention to two engine designs which have been described in the contemporary journals *Model Aircraft* and *Model Car News* respectively.

The first of these, the “Atom Minor Mark III” 6-c.c. engine is, as its name implies, a direct development of a well-known line of model aircraft engines, and though designed primarily for this purpose, it is equally suitable for model cars and boats, its only disadvantage for these purposes being the rather awkward size, which falls between the capacity classifications now generally observed. It is based on the earlier 6-c.c. “Atom Minor” engine—which, for purposes of identification, has now been classed as the “Mark II,”—but it embodies also some of the successful features of the “Kestrel” engine, including the use of the rotary admission valve.

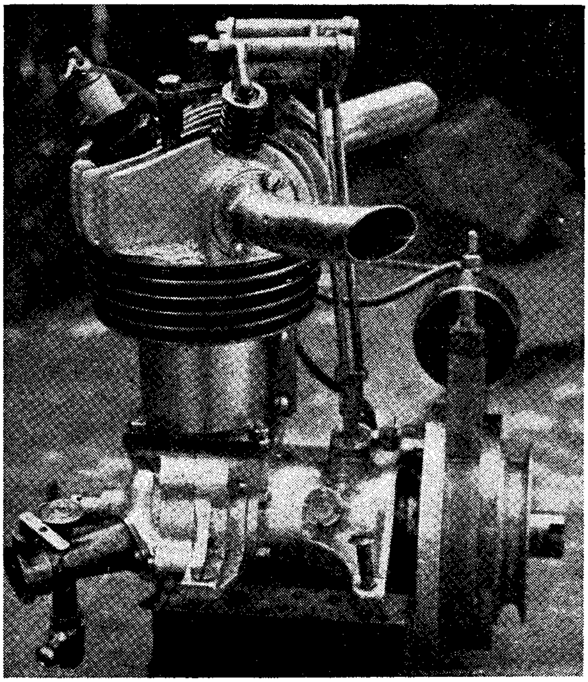
One of the virtues of this engine, which will commend it to the raw beginner, is an almost complete absence of temperament; it is one of the most docile engines I have ever handled, and a consistently easy starter. Only on very rare occasions, when some obvious fault, such as an ignition failure or a block in the fuel supply, has occurred, has it ever let me down; and for this reason it has been my sure stand-by for demonstration purposes over a very long period. It has also been used as an experimental hack in the development of small ignition coils and magnetos, the original “Atomag” having been tried out on it, and is still fitted thereto.

The robustness of mechanical design is also worth noting, and in its standard form, it is capable of a moderately efficient performance for a span of working life three or four times as great as that of many engines in a similar class, while being capable of tuning up to a much higher performance if desired.

As this engine is so well suited to the requirements of the novice constructor, arrangements are now in hand for the publication of an instruction handbook, describing in full the machining and fitting of its components, which will be available from THE MODEL ENGINEER Publishing Department in due cousre. Fully detailed blue prints are obtainable now.

Another recently introduced design, in this case a completely new departure, is the “Ensign” 10-c.c. engine, designed primarily for use in model racing cars, but equally suitable for other purposes, including “C” class model racing boats. In order to comply with the space limitations encountered in model cars, where head room is restricted, this engine incorporates features which enable its height to be reduced to the minimum, including a short stroke, the cylinder dimensions being $\frac{15}{16}$-in. bore by $\frac{7}{8}$-in. stroke.

A rather unique feature of the design is the use of a slipper piston, though this is optional, and a more conventional form of piston may be used, though the deflector design and porting are unorthodox. Two diametrically-opposed exhaust ports are provided, with transfer ports of the re-entry type at right-angles to them,



Two-stroke or four-stroke?—an interesting experimental engine by Mr. W. Tomkinson

and fitted with detachable port covers.

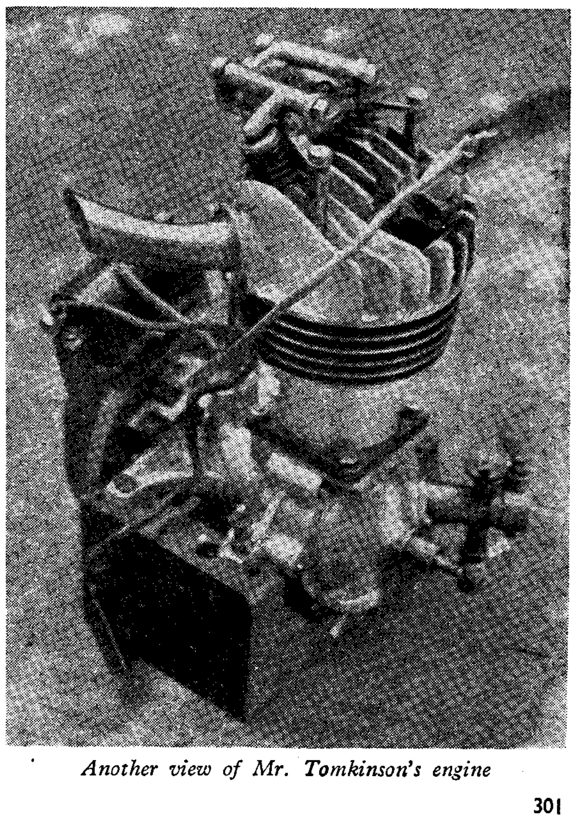
In common with many other of my engines, a disc-type rotary admission valve is incorporated, and the induction port enters obliquely, which not only enables an unusually compact carburettor to be fitted, but also favours efficient entry of the mixture at high speed.

As this engine is designed for racing, it is a little more temperamental than the "Atom Minor," but by no means difficult in this respect, and its construction is perfectly straightforward. Blueprints are available from THE MODEL ENGINEER Publishing Department, and castings and parts are supplied by Messrs. T. Garner & Son Ltd., 5, Sheffield Road, Barnsley. The castings deserve special mention, as their quality is outstanding; they are gravity die castings in special aluminium alloy, and call for the minimum amount of marking out and machining. An entirely new development is the use of a light alloy cylinder having a liner of 35-ton carbon-steel cast in, by a process which ensures perfect contact between the two metals, and entirely dispels all fear of trouble through difficulties in fitting, or differential expansion at high temperature.

Other new two-stroke designs are in progress—by which I mean that prototypes have been constructed and are now being exhaustively tested—and these include a 5-c.c. short-stroke racing engine and a 15-c.c. "hack" suitable for prototype or racing boats, or any other odd job calling for reliability and endurance.

Unusual Two-strokes

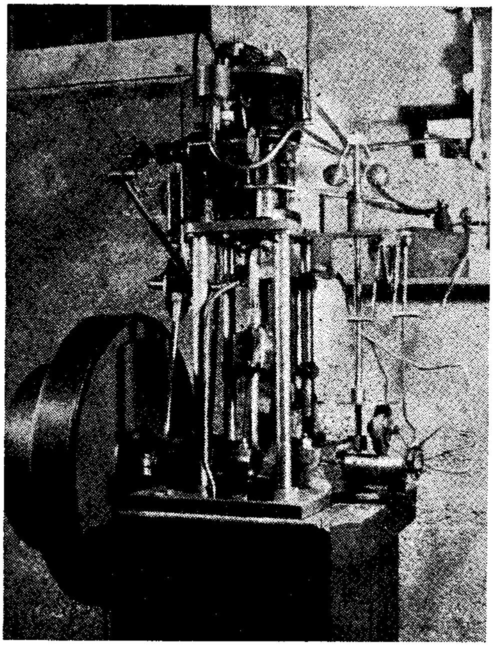
Many readers have come to the conclusion that there is very little scope left for original design in the orthodox type of two-stroke engine. While I do not agree entirely with this view, I admit that many designers of small engines do very little beyond ringing the changes on old and well-worn features of design, and I have deplored this tendency as one which is liable to become monotonous, and to detract from the interest in model petrol engines generally. The newcomer to model engineering, on finding that practically all the small petrol engines in existence, whether produced by amateurs or professionals, are of a very similar type, may very likely jump to the conclusion that these represent the only practical possibilities in small I.C. engines, and consider that there is more variety of interest in other types of models.



Another view of Mr. Tomkinson's engine

In my series of articles on "Improving the Two-Stroke," published in THE MODEL ENGINEER during the war, I showed that there are many possibilities for the development of two-stroke engines of unconventional types, and while most of the ideas for the improvement of design in this way involve new problems or introduce complication, they present features of great interest to the experimenter and the seeker after variety. The opinion has often been expressed by authorities on engine design that the two-stroke engine, in a form highly improved and freed from the cramping ultra-simplicity of the present-day crankcase-compression "valveless" type, may eventually supersede the four-stroke engine—unless both types of engines are completely ousted by the I.C. turbine, or some form of non-rotary reaction-propulsive motor. (For the class of engine in which we, as model engineers, are mainly interested, I regard the latter eventuality as a long way in the future.)

In the above series of articles, I illustrated examples of two-stroke engines with separate pumping cylinders or rotary blowers, valve gearing of various kinds, and unorthodox porting arrangements; also double-acting, dual-piston, and "harmonic induction" or pumpless engines. All these offer infinite possibilities for development, and there is an increasing interest among readers for breaking away from convention by adopting such principles.



Steam or petrol?—another unusual type of engine by a Canadian reader

An O.H.V. Two-Stroke

A typical instance of this line of thought is illustrated by the two photographs shown on page 301, which represent a 30-c.c. speed-boat engine, constructed by Mr. W. Tomkinson, of the Altrincham Model Power Boat Club. Many readers, confronted with these photographs, or even on a superficial examination of the actual engine, would pronounce it, without hesitation, to be a more or less orthodox push-rod type overhead-valve four-stroke engine. But a closer examination will reveal the fact that both the valves are operated from a single tappet, and that they both control exhaust ports; also that the carburettor leads not into the cylinder head, but into the crankcase.

The engine is, in fact, an honest-to-goodness two-stroke, employing crankcase compression and a fairly normal transfer system by piston-controlled ports, but having the exhaust events controlled by poppet valves. While the engine is, I believe, unique among its class, these features of design are by no means without precedent in full-size practice. Large diesel engines built on the Kadenacy principle, embody mechanically-operated exhaust valves, which may also be found in the Petter, Burmeister and Wain, G.M.C., and Gray engines, though the two first-named work on the "harmonic induction" scavenge principle and the others are charged by means of a rotary blower.

The potential advantages of using mechanically-operated valves of any type in the cylinder head, in preference to the usual piston ports, are that it introduces end-to-end scavenging, allowing rotary-turbulent flow of the incoming mixture, tends to cooler running of the piston, and permits the exhaust events to be more accurately timed. On the other hand, it detracts to some extent from the mechanical efficiency, as some power is necessarily absorbed in the valve operation, introduces problems in cam and valve-gear design, in view of the extremely short opening period, which involves much more rapid acceleration of the working parts than in a normal four-stroke engine, and, finally, destroys that "beautiful simplicity" of mechanism which is so much admired by many two-stroke devotees.

Whether the advantages of such an engine outweigh the disadvantages is a question which can only be settled by experiment. I can only say at this stage that I have seen Mr. Tomkinson's engine running, and have been impressed by its easy starting, reliability and general performance, though I have no record of the speed or power developed. The engine sounds more like a four-stroke engine than a two-stroke, and as most of the exhaust heat is dissipated by a well-finned cylinder head, it appears to run somewhat cooler than the average two-stroke.

Further particulars of this engine are as follows: the crankcase design is based on that of the "Atom V" engine, modified to take ball races at each end of the main housing, and the cam which operates the exhaust valves is mounted on the shaft between these races, operating on a tappet having sockets for the two push rods in the head, and working vertically in a bronze guide.

Mixture is admitted to the crankcase by a

rotary valve of the disc type, as in "Atom V," and is transferred to the cylinder by double-row ports of the "re-entry" type (uncovered both above and below the piston at bottom dead centre) which extend completely around the cylinder and are enclosed by a sheet metal belt clamped round the cylinder skirt. The ports are shaped so as to enter the cylinder tangentially, and thereby impart a rotary swirling motion to the incoming mixture.

The object of the two simultaneously-operated exhaust valves, of course, is to provide as large an area of opening as possible without using an abnormally large single valve, which would be cumbersome to operate and difficult to keep cool. I may put on record the fact that the engine runs quite well and develops considerable power when one push rod is removed, so as to put one of the valves out of action. Ignition on this engine is by means of a flywheel magneto, on general lines similar to magnetos which I have described, which produces a very powerful spark even at starting speed, and no doubt accounts in some measure for the easy starting. An unusual but very prudent feature on this magneto is the provision of a safety spark gap, to release excess h.t. voltage.

I have news of other unorthodox two-stroke engines either in use, in construction, or in contemplation. One such engine which I was shown by a reader some time ago is an engine of the oscillating type, very similar in mechanical principle to a simple steam engine, and using the space below the piston for pre-compression of the mixture. The particular specimen is of unknown origin, and both its design and construction are open to criticism, but the idea has possibilities for certain applications, and I believe that an engine of this type was once in production for marine and stationary work.

Two other very interesting engines have just been brought to notice by a Canadian reader, and I am trying to get further particulars of them. Both engines are of rather large size for a model, and one is used to drive a 5-in. lathe, which it does quite satisfactorily at a speed of only 200 r.p.m. It is built like a steam engine, looks like a steam engine, and runs like a steam engine. My correspondent makes the statement—with which I am at least partially in agreement—that if you build a petrol engine on steam engine lines it will run like a steam engine, and *vice versa*. (It is certainly true that all the features of a petrol engine which are objected to by the ardent steam enthusiast are reproduced in nearly all steam engines as soon as one attempts to design them to produce maximum speed and power, and conversely, a petrol engine can be made to produce a much wider range of flexibility, and will run much more silently than many people believe, if designed expressly with this end in view.)

Such an engine as described would probably delight the many readers who declaim that "You can't beat steam!"—or would it?

"L.B.S.C."

(*Continued from page* 298)

$6\frac{1}{2}$ in. long, and in the side hole a similar pipe about 10 in. long; silver-solder both at one heat. Bend the shorter pipe as shown; poke the screwed end of the fitting through the hole in the soleplate, and run the nut over the pipe, screwing it tightly on the fitting, as shown. Bend the pipes so that the upper one terminates just under the filler lid, and the other so that it lines up with the bit of pipe leading to the by-pass valve on the engine drag-beam.

Feed Pipe Strainers

The two gauze strainers, for the eccentric-driven pump and injector feeds, are shown on the drawing spaced well apart. This is merely for the sake of a clear illustration; actually, they may be placed side by side, and close to the front plate of the tender, for the shorter the water feed pipes are, the better the flow, which is important. Long pipes are prone to get air-locked, especially when they are small in the bore. The hole for the injector strainer can be drilled, say about 3 in. from front of soleplate, and $1\frac{1}{2}$ in. to the left of centre line; the one for the pump strainer parallel with it, and 1 in. off centre-line, to line up with the pump feed pipe under the engine drag-beam. Drill a $\frac{1}{8}$-in. pilot hole first, then enlarge to $\frac{3}{8}$ in., and file off any burr.

Castings may be provided for the flange fittings; but if not, chuck a piece of $\frac{3}{4}$-in. brass rod in three-jaw, face the end, and turn down $\frac{3}{8}$ in. length to about $\frac{5}{16}$ in. diameter. Part-off at $\frac{1}{4}$ in. from shoulder. Reverse in chuck, and turn down 5/32 in. length to a bare $\frac{5}{16}$ in. diameter; face, centre and drill $\frac{3}{16}$ in. to a depth of $\frac{1}{2}$ in. Drill a No. 14 hole in the side of the longer end, breaking into the middle passage-way; and in the flange, drill three No. 40 or 43 holes for the fixing screws. Fit a short length of $\frac{3}{16}$ in. copper tube in the hole at the side, and silver-solder it. Roll up two fingers of fine-meshed brass or copper gauze, about $\frac{5}{16}$ in. in diameter and $1\frac{1}{4}$ in. long; squeeze the tops flat and fold over, so that water cannot enter without passing through the gauze. Fit these to the open ends of the flange fittings, and solder in place. The complete strainers are then attached to the tender soleplate as shown, poking the fingers through the $\frac{3}{8}$-in. holes, and using either 3/32-in. or 8-B.A. brass screws, any shaped head, running through the clearing holes in flange, into tapped holes in the soleplate. Put a jointing gasket of 1/32-in. Hallite or any other good jointing material, between flange and soleplate. Don't fix the injector strainer permanently yet, as we have to make and fit the valve before doing this.

THE VICTORIA REGATTA

THE Victoria M.S.C. held their 1947 regatta on Sunday, July 27th, and many enthusiasts from various clubs affiliated to the M.P.B.A. were present, with all types of boats.

The regatta was originally fixed for July 6th, but the postponement was, perhaps, all to the good, since this day really broke the Victoria "bad weather" bogy. Under brilliant summer weather, this was model power-boating at its pleasantest, and the various events gave much entertainment to the large crowds lining the pondside.

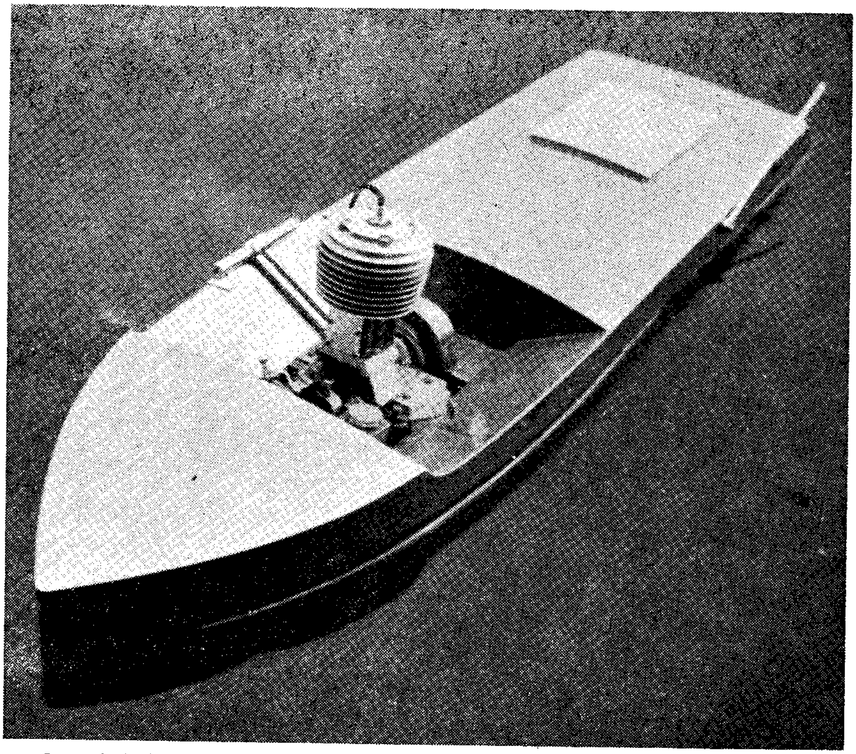
The Nomination Race, over an 80-yd. course, was the first event, and a fine display of prototype and other straight running craft were seen.

Mr. E. Vanner (Victoria), ran his new tug, *Ida*, besides *Leda III* and *All Alone*, but *Ida* appeared to have engine trouble and stopped half-way up the course. *All Alone* and *Leda III* made nice runs, however, to make up for this.

A veteran member of the Victoria club, Mr. Godfrey, with his battle-cruiser, *Conquest*, gave a fine show by returning a correct nomination, and three of the Blackheath boats also came very close to their nominated times. Mr. Griffiths, with *Orangeleaf*, was the best of the latter, but Mr. J. Benson with *Comet* and Mr. J. Jepson with *Darky*, both were only ½ sec. out. Mr. J. Benson gained third place, however, on percentage of nominated time.

The next event was a 500-yd. race for "A" class boats, and several well-known boats took their turn "round the pole,"

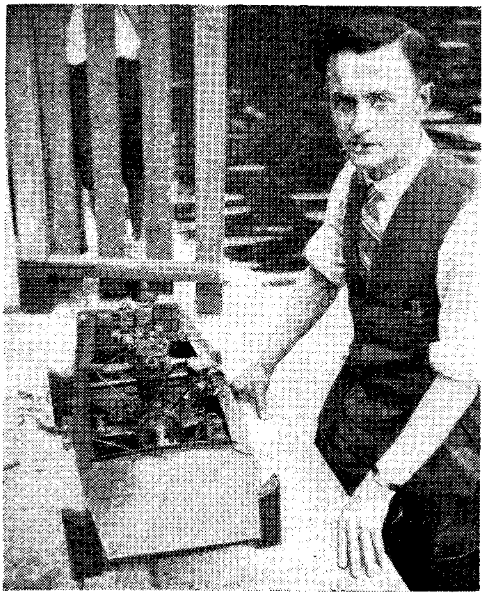
Mr. E. Clarke (Victoria), whose series of boats named *Tiny* gained some reputation before the war, was running a new boat, *Gordon.* This boat showed great promise, covering several laps at good speed, but unfortunately failing to complete the necessary 500 yd. on either of the runs allowed.



One of the handsomest "A" class racing boats: Mr. Weaver's "Fleche d'Or"

The best regatta performance that he has made this year was shown by Mr. Pilliner (Guildford), when his flash steamer *Ginger* covered the course in 24.91 sec. (41 m.p.h.), and Mr. Cockman (Victoria), with *Ifit VI*, also put up a good performance, but not at its best speed, taking 27.65 sec. to complete.

Mr. Parris (S. London), with *Wasp III*, ran consistently, returning a time of 31.15 sec. Mr. Weaver (Victoria), with his two-stroke engined boat *Fleche d'Or*, had cutting-out trouble again—it is hoped Mr. Weaver will be able to cure this fault, as the workmanship on the engine is superb.



Mr. Parris, with the veteran racer, "Wasp III," which won third place in "A" Class

After all the competitors had completed their second runs, the running of boats was adjourned in favour of the lunch interval.

Upon resuming, the Steering Competition was the next event, and the free-running craft made a further appearance.

The steering of the boats present was very much better than in other regattas held this year, and nearly all the boats competing registered a score of some sort.

A new large-scale model tug, by Mr. Brown (Victoria), *Sir Roger*, made a notable first appearance and scored 8 points.

Mr. Vanner was running *All Alone* in this event, and he scored a bull and two inners, 11 points. Mr. Curtis (Victoria), with *Micky*, also scored 11, and two re-runs were necessary before the issue was decided in favour of *All Alone*.

Several competitors scored 5 points or more, so that it appears that the target shooters are at last getting on top of this steering business.

The concluding event in the regatta was the "B" and "C" Class 500-yd. race. In this race the "B" and "C" Class boats ran together, and the results were sorted out afterwards.

The "C" Class boats put up a better show in this race than the "B" Class, although Mr. Heath's run of bad luck with *Derive* has not ended, and he could not complete the course on any of his attempts.

Mr. J. Cruickshank (Victoria), gave a consistant performance with *Defiant II*, the best attempt taking 30.77 sec. (32.48 m.p.h.). Mr. Weaver (Victoria), with his 10-c.c. four-stroke engined boat, *Wizard of Oz*, covered the course in 38.28 sec., although this boat has done considerably better than this on occasions.

Of the "B" Class boats, the best performance was made by Mr. Jutton (Guildford), with his flash-steamer *Vesta*. Although starting slowly, the boat accelerated towards the end to record a time of 48.26 sec. (21.2 m.p.h.).

The winners were:

80-yd. Nomination Race

1st, Mr. Godfrey (Victoria), *Conquest*; error, nil.

500-yd. Race for "A" Class Boats

1st, Mr. Pilliner (Guildford), *Ginger*, 24.91 sec. (41 m.p.h.).

Steering Competition

1st, Mr. Vanner (Victoria), *All Alone*, 11 pts.

500-yd. Race for "B" Class Boats

1st, Mr. Jutton (Guildford), *Vesta*, 48.26 sec., (21.2 m.p.h.).

500-yd. Race for "C" Class Boats

1st, Mr. Cruickshank (Victoria), *Defiant II*, 30.77 sec. (32.48 m.p.h.).

Mr. J. Benson, with his straight and speedy steam-driven boat "Comet"

Improving a Fixed Steady

by Ian Bradley

RECENTLY, I have had occasion to do some work on the three-point fixed steady belonging to my lathe. This steady is one of a class which has no fine adjustment for the jaws, these being pressed by hand against the work whilst they are " locked " by means of thumb-screws which make abutment on flats formed axially on the jaws. I said " locked " ; but this is an optimistic statement, for the jaws cannot be positively locked, so there is no guarantee that they will not back away under load. Moreover, repeated attempts to secure them only result in their surfaces becoming indented in several places ; and this, in itself, is most detrimental to security, as the thumbscrews invariably try to seat themselves in an indentation, regardless of whether the jaws are in contact with the work or not.

If any manufacturer still makes this class of steady I would most respectfully urge him to desist, for the type is fundamentally unsound. There are many excellent ways of making an efficient steady cheaply, but drilling three $\frac{3}{8}$-in. holes at 120 deg. in a hinged casting, and fitting cylindrical bronze jaws which it is hoped to lock by means of a single $\frac{1}{4}$ in. thumb-screw, is certainly not one of them. I think it is most likely that other readers may be having this sort of bother and might be interested in some solutions of the difficulty.

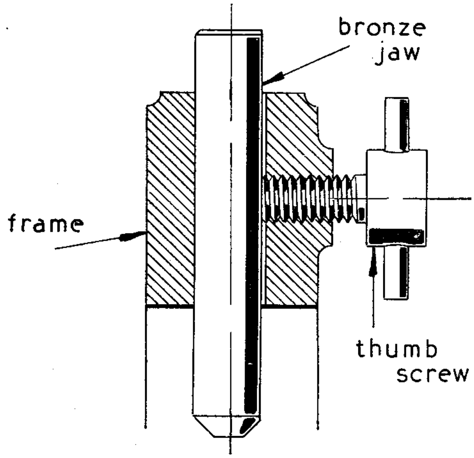


Fig. 1

I must say at once that the modifications involved are not necessarily simple, nor can they be accomplished in a fraction of time. In an existing component, when poor design has to be improved, the work is usually time-eating, and the extent of the improvement tends to be limited by past misdeeds.

Fig 1 shows the original design with the bronze jaw " locked " by a thumb-screw.

Fig. 2 is a possible and fairly simple modification ; here the thumb-screw is discarded and its place is taken by a set-screw to prevent the jaw rotating. These screws just clear the jaw when right home. The casting of the steady frame is machined out as shown in the drawing to take a housing which carries the adjusting-screw. The jaw projects into the bore of this housing and must be a nice sliding fit in both the housing and the frame ; therefore, both must be in perfect alignment. Whilst it is possible to make the housing in one piece, it is probably simpler to machine if made with a separate cap as shown. In this way, a reamer may, if necessary, be passed clear through the housing. The rest of the device will be self-explanatory. With such an arrangement the jaw cannot possibly back away.

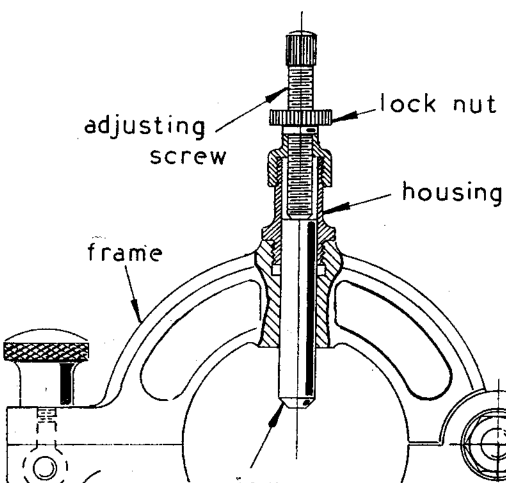


Fig. 2

A more elaborate modification is shown in Fig. 3. The same type of housing is used, but the adjusting-screw is made captive and is actually threaded into the jaw. Rotating the screw retracts or advances the jaw as desired. The setting is locked by the knurled cap-nut screwed to the top of the housing. When setting the jaws, this lock-nut should only be slackened just enough to allow the adjusting-screw to turn ; otherwise, undue pressure will be applied to the work when the nut is screwed down. This is the modification which I finally adopted.

All threads were made 40 T.P.I. because if the equipment is available[1] there are two advantages in doing this ; one is that each

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detail of the assembly can be kept small and neat, at the same time leaving sufficient material for strength; the other advantage is that continuous use of the micrometer makes the "feel" of a 40-thread screw automatic, thus greatly assisting in the setting of the steady.

In order to preserve the alignment of the jaws and housings, it is essential that all machining should be done "off the bore" into which the jaws fit. The best way to make sure of this is to machine the castings on a firm-fitting turned peg held in the chuck. The peg should have a flat filed on it, against which one of the original locking-screws can make abutment to stop the casting turning on the peg.

If the work is carried out in the lathe of somewhat higher centres than that to which the steady belongs, all the bores can be dealt with in this way, since the bottom half of the steady, which is considerably larger than the top half, will swing clear. If, on the other hand, the work is done on the lathe

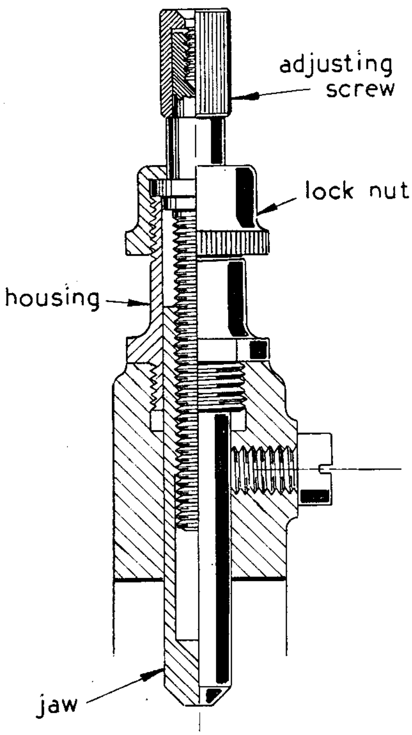

Fig. 3

to which the steady belongs, it will be necessary to mount the casting on an angle-plate bolted to the cross-slide, using the turned peg as a setting-piece. In this case, the peg must be eased until it is a sliding fit in the bore. When correctly set up, it should be possible to slide the casting on and off the peg by traversing the lathe saddle.

Actual machining can be carried out either by boring or, better still, by means of a piloted D-bit held in the chuck. This will ensure perfect results.

The thread in the jaw *must* be perfectly true or the device will "bind" in operation. As will be seen, the lower end of the jaw is chamfered out, and the threaded portion left only some $\frac{7}{8}$ in. in length. This allows enough thread and is about as much as can be tapped readily with a standard tap.

In conclusion, I will repeat my previous remarks; the job cannot be hurried; but if done properly, the results to be gained will amply repay the time expended.

For the Bookshelf

The World's Railways and How They Work. (London: Odhams Press Ltd.) Price 8s. 6d. net.

This is a book, well written and profusely illustrated, to which, apparently, several different authors have contributed. Not only does it deal with practically all the railways of the world, but it devotes much space to describing such matters as signalling, train control, locomotive mechanism and other important features relevant to railway making and operation, all in simple non-technical language which ensures that inexpert readers can understand and appreciate the subjects discussed. Although the book is obviously designed to have as wide a "popular" appeal as possible, it contains much sound information and even some attractively exciting reading. Many of the illustrations are of the "cut-out diagram" type from originals which, for the most part, have been carefully and cleverly drawn; the artist, however, has unfortunately muddled the balance-weights at the foot of the signal-post seen on the left of the illustration on page 89. On the same page, the 3-arm upper-quadrant bracket signal is incorrect, in that the Branch distant should not be *higher* than the Main distant.

The half-tone illustrations take the reader, in effect, to nearly every country in the world, under-ground and over-ground; there are several maps of important railway networks, and there are numerous photographs of great bridges and other prominent features, several of which have been taken from unfamiliar viewpoints. The very great variety which pervades railway transport is here concisely presented, and we can cordially recommend the book to anyone who is, even superficially, interested in railways.